

A taxonomic revision of *Tarenna* Gaertn. and *Triflorensia* S.T.Reynolds (Rubiaceae: *Ixoroideae: Pavetteae*) in Australia

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Summary

Reynolds, S.T. & Forster, P.I. (2005). A taxonomic revision of *Tarenna* Gaertn. and *Triflorensia* S.T.Reynolds (Rubiaceae: *Ixoroideae: Pavetteae*) in Australia. *Austrobaileya* 7(1): 29–55. Revisions are presented for the Australian representatives of *Pavetteae* excluding the genus *Pavetta* L., viz. *Tarenna* Gaertn. (three species, two subspecies) and *Triflorensia* S.T.Reynolds (three species). The following are described as new, *Triflorensia* S.T.Reynolds genus nov., *Tarenna* subgenus *Pacifica* S.T.Reynolds subg. nov. and *Tarenna monticola* S.T.Reynolds & P.I.Forst. sp. nov. New combinations are made in *Tarenna* for *T. pentamera* (Benth.) S.T.Reynolds and *T. dallachiana* subsp. *expandens* (F.Muell. ex Benth.) S.T.Reynolds & P.I.Forst. and in *Triflorensia* for three species previously included in *Diplospora* or *Tarenna*, viz. *T. australis* (Benth.) S.T.Reynolds, *T. cameronii* (C.T.White) S.T.Reynolds and *T. ixoroides* (F.Muell.) S.T.Reynolds. Lectotypes are selected for several names. All recognised taxa are described with notes on their affinities, habitat, distribution, conservation status and etymology. Keys to taxa, distribution maps and line drawings of some of the taxa are also provided.

Key Words: Rubiaceae, *Tarenna* subgenus *Tarenna*, *Tarenna* subgenus *Pacifica*, *Tarenna dallachiana* subsp. *expandens*, *Tarenna monticola*, *Tarenna pentamera*, *Triflorensia australis*, *Triflorensia cameronii*, *Triflorensia ixoroides*, Australian flora

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Introduction

The classification of the genera and suprageneric taxa of Rubiaceae remains in a state of flux in the light of proposed phylogenies based on both morphological and molecular data sets. The formal classification of genera into subfamilies, tribes and subtribes within Rubiaceae was last comprehensively reviewed by Robbrecht (1988) with additions five years later (Robbrecht 1993), but since then there have been a number of wide ranging phylogenetic studies, primarily using molecular data, with results that have challenged this morphologically based classification (e.g. Andreasen *et al.* 1999; Bremer *et al.* 1999; Andreasen & Bremer 2000).

In the current paper a revision is presented of the Australian species of *Tarenna* Gaertn., together with the description and revision of a new genus *Triflorensia* S.T.Reynolds that is endemic to Australia and proposed to be closely allied to *Tarenna* and also to *Pavetta* L. (see Reynolds 1993). All three of these genera belong

in the subfamily *Ixoroideae*, with both *Pavetta* and *Tarenna* being grouped with *Dictyandra* Welw. ex Hook.f., *Leptactina* Hook.f. and *Rutidea* DC. in the tribe *Pavetteae* A.Rich. ex Dumort. (tribal description given below) on the basis of both morphological and molecular data sets (Andreasen & Bremer 2000). In the earlier classification of Robbrecht (1988), *Pavetta* and *Tarenna*, together with *Duperrea* Pierre ex Pitard., *Ixora* L., *Myonima* Comm. ex Juss. and *Versteegia* Valetton were all included in a polyphyletic *Pavetteae*.

Tarenna has long been treated in a broad sense by various authors including Bridson (1979), Bridson & Robbrecht (1985) and Smith and Darwin (1988). Bridson (1979) recognised six informal groups under *Tarenna s.l.* based mainly on placentation and seed types, for the African species. The Australian species fall into three ‘groups’ based more or less on the same characters used by Bridson (1979), two of these are retained under *Tarenna*, whereas one is transferred to the closely related genus *Triflorensia*.

Coffea L., *Discospermum* Dalzell, *Psilanthus* Hook.f. and *Tricalysia* A.Rich. ex DC. (Andreasen & Bremer 2000). An account of the Australian genera and species of *Coffeae* was provided by Forster (2004).

The three species transferred to *Triflorensia* have had a chequered nomenclatural history, starting in *Diplospora* DC. (Bentham 1867; Mueller 1875; White 1926) and most recently being combined in *Tarennia* (Ali & Robbrecht 1991). The genus *Diplospora* is now restricted to species found in Asia and Malesia and is included in the tribe *Coffeae* DC. together with *Bertiera* Aublet., *Coffea* L., *Discospermum* Dalzell, *Psilanthus* Hook.f. and *Tricalysia* A.Rich. ex DC. (Andreasen & Bremer 2000). An account of the Australian genera and species of *Coffeae* was provided by Forster (2004).

Materials and Methods

The initial draft of this revision was undertaken by the first author prior to 1998. It has been updated in 2005 by the second author, particularly in terms of introductory information about recent generic phylogenies and new data pertaining to species distribution, habitat and conservation status.

The revision is based on morphological characters derived from herbarium specimens (dried sheets, spirit material) at BRI, CANB, DNA, K, NSW and QRS examined by the first author, with supplementary observations and measurements by the second author of specimens accessioned at BRI since 1995. Measurements encompass the main range of variation, with aberrant or unusual data indicated in brackets, e.g. (8–) 12–15.

Common abbreviations in the specimen citations are L.A. (= Logging Area), N.P. (= National Park), S.F. (= State Forest), S.F.R. (= State Forest Reserve) and T.R. (= Timber Reserve).

Species are defined as groups of populations (1-many) with discontinuities in the variation of two or more independent character states of morphology. It is assumed that there is genetic continuity or at least a shared ancestral lineage between the different populations of a

single species. Although species definitions remain a matter of opinion and debate, the one applied here ('phenetic species concept') is widely used and understood (Stebbins 1950; Cronquist 1988; Stuessy 1990; Levin 1979, 2000) and would also equate to the 'diagnostic species concept' of Judd *et al.* (2002). Characters most commonly used in the identification keys are those of inflorescence morphology, leaf lamina shape, flower morphology (particularly shape, size and indumentum cover) and fruit size and shape.

If only a single, or several minor (e.g. indumentum colour or density) character state differences are present and the discontinuity is geographically based, the rank of subspecies is used. It is generally considered that subspecies should differ in only a few minor characters and that intermediate populations should exist to demonstrate continuity of character states (e.g. Stebbins (1950) states "subspecies....connected....by a series of intergrading forms" or Stace (1989) states "a population of several biotypes forming a more or less distinct regional facies of a species....a geographical race, ecotype, topodeme or genoecodeme"). In this revision subspecies are recognised within *Tarennia dallachiana* due to the existence of intermediate forms.

Taxonomy

Tribe *Pavetteae* A. Rich. ex Dumort., *Anal. Fam. Pl.* 33 (1829); Bridson & Robbrecht, *Bull. Nat. Plantentuin Belg.* 55: 83–115 (1985); Andreasen & Bremer, *Amer. J. Bot.* 87: 1743 (2000).

Shrubs, small trees or lianas; stipules interpetiolar, entire; leaves entire, without raphides; inflorescences terminal on main or lateral branches, rarely pseudo-axillary, trichotomously branched. Flowers 4 or 5-merous; corolla lobes contorted to the left; corolla tubes long and slender tubes (usually much longer than its lobes), anthers affixed at throat and exserted; stylar pollen presentation present; pollen grains 3–4(–5) colpi; style exserted or rarely included in the corolla tube, the stigmas fusiform, clavate, not lobed; ovary 2-locular, axile placentation with 1-many ovules, the ovules either attached to the central septum, or embedded on a fleshy placenta which is

attached to the dissepiment usually near the middle. Fruits fleshy, 1-many seeded; seeds either 4-many in each cell of the fruit, then very small, angular and reticulate, or seeds solitary or 2 in each cell of the fruit, then large \pm

hemispherical, rounded dorsally, and with an adaxial excavation on the ventral side.

Distribution: Mainly Paletropical. About six genera, three (one new) in Australia.

Key to the Australian genera of *Pavetteae*

1. Stipules connate to above its middle into an oblique sheath; inflorescences terminal on main and lateral branches; bracts at base of trichotomous inflorescence branches connate, membranous; ovules and seeds one in each cell of the ovary or fruit; fruits without a thin crustaceous shiny endocarp **Pavetta**
- Stipules slightly united at base only; inflorescences terminal on main branches; bracts at base of trichotomous inflorescence branches free or connate towards their base; ovules and seeds 1-many in each cell of the ovary or fruit; fruits with a thin crustaceous shiny endocarp 2
2. Inflorescence branches terminated by 3-flowered dichasial cymes; bracts at base of the trichotomous branches of the inflorescence shortly connate; bracteoles paired, one on each side of the calyx; flowers 4 or 5-merous; seeds 2 in each locule of the fruit, rounded on top, angular on its sides; stipules usually obtuse **Triflorensia**
- Inflorescences branches not terminated by 3-flowered dichasial cymes; bracts at base of inflorescence branches free; bracteoles 3 or 4, alternate on the pedicel (one on calyx); flowers 5-merous; seeds either small and 4-many in each locule of the fruit (if so, then angular, reticulate (like orange segments)), or large and solitary in each cell of the fruit (if so, then subglobose, rounded on top and with a thick rimmed circular excavation on its ventral side); stipules acuminate **Tarenna**

Tarenna Gaertn., *Fruct. Sem.* 1: 139, t. 28 (1788).

Type: *T. asiatica* (L.) Kuntze ex K. Schum. (based on *Rondeletia asiatica* L.; syn. *T. zeylanica* Gaertn.)

Chomelia L., *Opera Varia* 210 (1758) *nom. rej.*

[*Webera* auct., non Schreber: Bentham, *Fl. Austral.* 3: 412 (1867); F.M. Bailey, *Queensland Fl.* 3: 752 (1900)].

[*Styllocoryne* auct., non Cav.: Domin, *Biblioth. Bot.* 617 (1929)]

Shrubs or small trees; branchlets terete or 4-angled towards their tips. Leaves petiolate, often blackish when dry; stipules persistent, erect, free or connate towards base, ovate or triangular-ovate, sometimes articulated towards

base, acuminate or aristate at apex, usually with a darker central area and paler margins, provided with a prominently bifid keel (the keel bifid towards base) and with collectors towards its base inside. Inflorescences terminal, many-flowered, corymbiform panicles, trichotomously branched, the three branches clustered on a short peduncle or clustered at apex of the branchlet subtended by the uppermost pair of leaves; lowermost branches usually patent; ultimate cymules 2–5-flowered; bracts free or slightly connate (towards the base), and with very narrowly lanceolate lateral lobes. Flowers bisexual, 5 (rarely 4)-merous, fragrant; pedicellate; bracteoles small, alternate on the pedicels, subulate or ovate. Calyx tube subcyathiform or cupular; limb wider and thinner, 5 (rarely 4)-lobed at apex, with lobes imbricate, ovate or hemispherical. Corolla white;

tube infundibuliform or cylindrical and usually dilated towards apex, longer or shorter than the lobes, usually hairy at throat; corolla lobes 5 (rarely 4), twisted to the left in bud, ± oblong, patent or reflexed, hairy inside. Stamens 5 (rarely 4), inserted at throat (slightly below the orifice of corolla tube); anthers long, narrowly ovoid, with a prolonged ovate connective at apex, slightly sagittate at base, dorsifixed; filaments much shorter, glabrous. Disc fleshy, annular. Ovary 2-locular; ovules 1-many per locule, ovoid, attached to septum or impressed on the semicircular placenta which is attached to the septum; style (with stigma) shortly exceeding the corolla tube or long exserted; style filiform, hairy towards middle or glabrous; stigma long, fusiform or clavate, with lobes coherent for most of stylar length or stigma bifid at apex. Fruits shiny, usually blackish when ripe, subglobose, crowned by persistent calyx, 2-locular; seeds 1-many per locule, if many they are blackish, angular, rugulose and closely reticulate resembling orange segments, or if solitary, subglobose, smooth or finely reticulate on top, and with a circular excavation (hilar cavity) on their ventral side; pericarp smooth outside; endocarp thin, crustaceous, very shiny and brown.

Tarenna has c. 370 species (Wong 1989; Ridsdale 1998) in tropical Africa, Asia, Pacific Islands, New Guinea and Australia (three species).

Etymology: The name *Tarenna* is derived from “*Tarana*” a Sri Lankan plant name.

Diagnostic features: The genus *Tarenna* (in Australia) is characterised by its terminal, trichotomous corymbiform panicles, (4-) 5-merous flowers, styles with fusiform stigmas, small, globose, 1-many seeded fruits with a thin, shiny, crustaceous endocarp, usually blackish discoloration of its leaves and inflorescences, 4-angular young branchlets, and triangular acuminate stipules with softer paler margins and a bifid keel. *Tarenna* may be distinguished from other members of the tribe *Pavetteae* in Australia, viz. *Pavetta* and *Triflorensia* as indicated above.

Infrageneric Classification

Three subgenera are recognised under *Tarenna* here: two of these were previously recognised as sections by Hooker (1882: 104) and Valetton (1924: 84). Only the subgenera *Pseudoixora* and *Pacifica* occur in Australia.

Key to subgenera

- 1. Ovules solitary in each cell of the ovary, attached to the septum; seeds solitary in each cell of the fruit, large, smooth, subglobose, with a thick-rimmed circular excavation on its ventral side **3. Pseudoixora**
- Ovules 4-many in each cell of the ovary, impressed on the suborbicular placenta which is attached to the septum; seeds 4-many per fruit, small, angular, densely reticulate, resembling orange segments **2**
- 2. Branchlets usually stout, 4-angular towards their apices; stipules large, triangular, acuminate or aristate at apex, darker in the centre and with paler soft margins; inflorescences large, many-flowered; calyx lobes ± hemispherical or ovate; corolla tube long and slender, usually much longer than its lobes; style usually much exserted from the corolla tube **2. Pacifica**
- Branchlets usually slender, terete or ±4-angular towards their apices; stipules ovate, cuspidate at apex, coriaceous; inflorescences smaller, loosely branched and flowered; calyx lobes ovate; corolla tube usually as long as its lobes; style usually slightly exserted from the corolla tube **1. Tarenna**

1. *Tarenna* subgenus *Tarenna*

Type: *Tarenna asiatica* (L.) Kuntze ex K. Schum. (syn. *T. zeylanica* Gaertn.).

Webera sect. *Webera* Hook f., *Fl. Brit. India* 3: 104 (1882). **Type:** not designated.

Distinguishing characters as indicated in the key above.

Distribution: Mainland Asia (China, Indian subcontinent) and south-east Asia (Wong 1989; Ridsdale 1998).

Notes: *Tarenna appressa* (King) Corner from India and *T. lanceolata* Chun & How ex W.C. Chen from China also belong to this subgenus (*vide* specimens at K, L).

2. *Tarenna* subgenus *Pacifica* S.T.Reynolds **subgenus nova** quoad placentam et semina *Tarennae* subg. *Tarennae* similis autem inflorescentiis grandioribus multifloris, tubis corollae lobis multo longioribus, lobis calycem hemisphericalis, stipulis magnis triangularis marginibus pallentioribus, mollioribusque praeditis, ramulis 4-angularibus differt. **Typus:** *Tarenna sambucina* (Forst.f.) Durand ex Drake (syn. *Coffea sambucina* Forst.f.).

Tarenna sect. *Multiovulatae* Valeton in Lauterbach, *Beitr. Fl. Papuasien* 13, *Bot. Jahrb.* 60: 84 (1924). **Type:** *Tarenna sambucina* (Forst.f.) Durand ex Drake

Trees or shrubs with stout, 4-angular

branchlets; large broad triangular stipules which are acuminate or aristate at apex, and usually provided with a thicker darker area in the centre and softer paler edges. Inflorescences large, usually many-flowered; flowers with long, slender corolla tubes which are usually much longer than its lobes; usually \pm hemispherical calyx lobes; long styles which are usually much exerted from the corolla tube; fusiform stigmas; ovary with 4-many ovoid ovules which are impressed on the fleshy placentas; 4-many-seeded fruits with small, angular reticulate seeds.

Notes: *Tarenna* subgenus *Pacifica* has the ovules, placenta and seeds of *Tarenna* subgenus *Tarenna*, but differs from it by its stout 4-angular branchlets, the large triangular stipules, large many-flowered inflorescences, and long narrow corolla tubes which are usually much longer than its lobes (see key to subgenera).

Two Australian species, *viz.* *Tarenna dallachiana* (F. Muell. ex Benth.) S. Moore and *T. monticola* S.T. Reynolds & P.I. Forst. are referable to this subgenus.

Distribution: Australia, New Guinea and islands of the Pacific and Indian oceans. Two species occur in Australia (*T. dallachiana* and *T. monticola*), one species in the Pacific Ocean (*T. sambucina*), one species in New Guinea (*T. barbellata* Valeton) and one species from the Indian Ocean (*T. buruensis* Merrill).

Etymology: The name of the subgenus alludes to the Pacific Region where the species referable to this subgenus are commonly found.

Key to the Australian species of *Tarenna* subgenus *Pacifica*

Corolla hairy outside, tube 8–22 mm long, lobes erect; seeds 4–16 per fruit, very rarely more; domatia in angle between lateral veins and midrib absent below; leaf apex obtuse, subacute or shortly acuminate **1. *T. dallachiana***

Corolla glabrous outside (rarely subglabrous), tube 4–7 mm long, lobes mostly recurved; seeds 14–26 per fruit; tufts of hair in angle between lateral veins and midrib present below; leaf apex mostly long acuminate . . . **2. *T. monticola***

1. *Tarenna dallachiana* (F.Muell. ex Benth.) S.Moore, *J. Bot.* 64: 94 (1926). *Webera dallachiana* F.Muell. ex Benth., *Fl. Austral.* 3: 412 (1867); *Ixora dallachiana* (F.Muell. ex Benth.) F.Muell., *Syst. Census Australian Plants* 1: 75 (1882); *Chomelia dallachiana* (F.Muell. ex Benth.) O.Ktze, *Rev. Gen. Pl.* 1: 278 (1891); *Stylocoryna dallachiana* (F.Muell.) Domin, *Biblioth. Bot.* 89: 617 (1929). **Type:** Queensland. COOK DISTRICT: Albany Island, date unknown, *W.Hill s.n.* (lecto [here designated]: K; photo BRI).

Small trees 2–8 m high, bark grey or mottled grey and white, smooth or tessellated; young branchlets and leaves finely hairy to glabrous; branchlets and petioles sometimes scurfy. Leaves petiolate; lamina elliptic, ovate-elliptic, broadly elliptic or elliptic-oblong, apex abruptly shortly acuminate, subacute or obtuse, base obtuse or subacute and attenuate into petiole, (12–) 14–25 (–27.5) × (3.7–) 5.5–9 (–13) cm, coriaceous, dries blackish or brownish, greenish or greenish brown and sometimes slightly glossy above; upper surface glabrous or hairy on the main nerves; lower surface usually pubescent with usually fine hairs all over (especially young leaves), or hairy only on the main nerves; lateral nerves 8–14 pairs, suboblique or patent, mostly arched at their tips; petioles (1–) 2–3.5 (–5) cm long, sparsely hairy or glabrous. Stipules 6.5–11 × 3–6 mm, triangular or ovate, gradually narrowing at apex to a subulate acumen or cuspidate, usually with a darker centre and paler softer margins, puberulent or glabrous, sometimes slightly viscid, usually with thick, viscid colleters at base inside. Inflorescences usually densely flowered (38–152-flowered); the 3 branches subtended by the uppermost pair of leaves of the branchlets; peduncles sparsely short hairy; central branch with 1 or 2 internodes (these 1–2.2 cm long); lateral ones 2–9 cm long, 12–152-flowered; ultimate branches 1–1.7 cm long, terminated by 2 or 3-flowered cymules or 9–24-flowered cymes; bracts subtending the inflorescence stipular, ovate, those at junction of the upper branches subulate; bracteoles 2–4, alternate on the pedicel, minute (about 1.5 mm long), narrowly ovate or subulate, ciliolate. Flowers perfumed; pedicels 2–9 mm long. Calyx 1.5–2.5 × 1–2 mm; tube glabrous or puberulous, dries blackish; limb paler, indistinctly toothed; calyx lobes small, 0.25–0.5 mm long, ± hemispherical, obtuse, truncate or retuse at apex,

ciliolate. Corolla tube cylindrical, gradually dilated from base to the mouth or dilated near mouth only, (8–) 12–22 mm long, 1–3 mm wide at mouth, 0.7–1.5 mm wide at base, straight or slightly curved, densely appressed hairy outside, sparsely appressed hairy inside; corolla lobes usually erect, elliptic, oblong obovate or subobovate, 3.5–6.5 × 1.5–3 mm, retuse or obtuse; disc glabrous. Stamens exserted; filaments 1–1.8 mm long; anthers 3.5–6.5 mm long. Styles 2.3–4.5 mm long, exserted (exserted portion (from corolla tube) 1–1.8 cm long), hairy towards the middle (from below stigma); ovary 2 locular; ovules (2–) 4–8 in each loculus, ovoid, impressed on the ± ovoid fleshy placenta which is attached to the septum. Fruits globose, topped by remnant calyx rim, dull olive, black when ripe, 6.5–8 × 6–8 mm; seeds (4–) 8–16 per fruit, small, *c.* 1 × 2 mm, angular, reticulate, black; fruit stalk 8–12 mm long.

Typification: Two syntypes were originally cited by Bentham (*viz.* Rockingham Bay, *Dallachy s.n.* (syn: MEL) and Albany Island, *Hill s.n.* (syn: K)). The Hill collection is the better of the two and is selected here as lectotype for the name.

Notes: *Tarenna dallachiana* is readily distinguishable by its usually large, glabrous or finely hairy, elliptic leaves which dry greenish, greenish-brown or blackish, large triangular stipules with soft edges and a bifid keel, 4-angular, darkish, usually scurfy young branchlets, many-flowered corymbiform inflorescences, ± hemispherical ciliolate calyx lobes, long corolla tube (tube dilated near apex or gradually tapering from mouth to base) which are appressed hairy outside, short, oblong corolla lobes, subsessile anthers which are nearly as long as the corolla lobes, and 4–14 seeded fruits.

The shape and size of leaves, the colour of dried leaves, the presence or absence of hairs on young branches and young leaves, and the length and shape of corolla tube are all very variable in the specimens available for study of this species. Two subspecies are recognised here that merge into each other at the outer parts of their respective ranges on Cape York Peninsula.

Etymology: The specific epithet honours the botanical collector John Dallachy (1808–1871) who collected many specimens for Ferdinand Mueller.

Key to subspecies of *Tarenna dallachiana*

1. Corolla tube 8–12 long, usually gradually dilated towards its mouth (2–3 mm wide at mouth); pedicels 2–5 mm long; seeds 4–8(–12) in each fruit; leaves 12–25 (–27.5) × 3.7–9.0 (–10.7) cm, dries blackish or dark brown, both surfaces glabrous or lower surface sparsely hairy on the main nerves; young branchlets and young leaves sparsely hairy or glabrous

..... **1a. *Tarenna dallachiana* subsp. *dallachiana***

Corolla tube 14–22 mm long, cylindrical, usually dilated only towards its throat (1–2.5 mm wide at mouth); pedicels (2–) 4–9 mm long; seeds (6–(6–) 8–12 (–16) in each fruit; leaves (10–) 15–22 (–24) × (3–) 6–9.5 (–13) cm, dries greenish or pale brown; upper surface glabrous or subglabrous, lower ones covered with soft hairs, or occasionally only the main nerves hairy; young branchlets and young leaves densely hairy with fine soft hairs (usually velvety)

1b. *Tarenna dallachiana* subsp. *expandens*

1a. *Tarenna dallachiana* subsp. *dallachiana*

Distinguishing characters as indicated in the key above.

Illustrations: Hyland *et al.* (1999, 2003); Cooper & Cooper (2004).

Selected specimens examined: Queensland. COOK DISTRICT: Upper Parrot Creek, Annan River, 15° 48'S, 145° 15'E, Sep 1948, *Brass 20293* (BRI); Mt Amos, Cooktown, 15° 42'S, 145° 18'E, Nov 1986, *Burkitt 61* (BRI); Fly Point, about 2 km SE of Somerset, 10° 45'S, 142° 36'E, Jul 1992, *Clarkson 9646 & Neldner* (BRI); Jardine River National Park, 11° 20'S, 142° 45'E, Aug 1987, *Fell DGF587* (BRI); Rex Range, Little Mossman S.F. 141, 16° 32'S, 145° 23'E, Jan 1993, *Forster PIF13071 & Bean* (BRI, QRS); Home Rule, 3 km E of Rossville, 15° 45'S, 145° 17'E, Apr 1999, *Forster PIF24247 & Booth* (A, BISH, BRI, K, L, MEL, QRS); Freshwater F.R., Lake Morris road, 16° 56'S, 145° 42'E, May 2005, *Forster PIF30957 & Jensen* (BRI, L, MEL, MO, NSW); track to Mt Misery from Shiptons Flat, 15° 49'S, 145° 13'E, Jun 2005, *Forster PIF31010 & Jensen* (BRI, L, MEL, NSW); Claudie River, 12° 43'S, 143° 17'E, Oct 1981, *Hyland 11179* (BRI); Upper Escape River, 11° 10'S, 142° 45'E, Aug 1976, *Kanis 2079* (BRI); Endeavour River, 1883, *Persieh 25* (MEL); Between Mulgrave and Russell Rivers, 1887, *Sayer* (BRI); Lower slopes of Mt Saunders, 15° 25'S, 145° 14'E, Mar 1984, *Scarth-Johnson 1410A* (BRI); Bamaga, Oct 1965, *Smith 12395 & 12581* (BRI); Mourilyan, Feb 1923, *White* (BRI). NORTH KENNEDY DISTRICT: Clump Point, Feb 1972, *Crome 263* (CANB, QRS); Rockingham Bay, *Dallachy s.n.* (MEL 1538176, NSW 19378 – residual syntypes); Strathdickie, Proserpine, *Michael 1264 & 1387* (BRI); Clump Point, Dec 1969, *Winkel s.n.* (BRI). SOUTH KENNEDY DISTRICT: Port Mackay, *Dietrich 375* (MEL); *loc. cit.*, 1885, *Marguart s.n.* (NSW 193797); *loc. cit.*, Oct 1882, *Griffith 93* (BRI). PORT CURTIS DISTRICT: Byfield near Keppel Bay, Sep 1931, *White 8169* (BRI).

Distribution and habitat: Eastern Queensland, chiefly coastal, from Cape York Peninsula to Keppel Bay; usually on ridges, gullies, hillsides and sometimes on river levees, mostly at the margins of rainforests (**Map 1**).

Notes: *Tarenna dallachiana* subsp. *dallachiana* is characterised by the darkish discoloration of its dried leaves and branchlets, glabrous or sparsely hairy branchlets (usually with antrorse hairs) and corolla tubes which are usually dilated from base to apex. The shape and size of leaves and presence of hairs are variable in this subspecies and a few forms appear to be present.

This subspecies usually has scurfy branchlets, thickly coriaceous, large or middle-sized, slightly glossy leaves that dry blackish or brown, and flowers with wide corolla tubes. Specimens with these characteristics, especially those from around Proserpine and Mackay, resemble the syntype from Rockingham Bay.

Specimens from Cape York Peninsula show considerable variation. Some resemble the above, whereas others with larger elliptic leaves that dry brown, and with glabrous branchlets and leaves resemble the syntype from Albany Island.

Specimens from Bamaga and Rex Range differ from the above in their longer, usually larger leaves, sparsely hairy young branchlets and young leaves and approach specimens from around Weipa included under subsp. *expandens*.

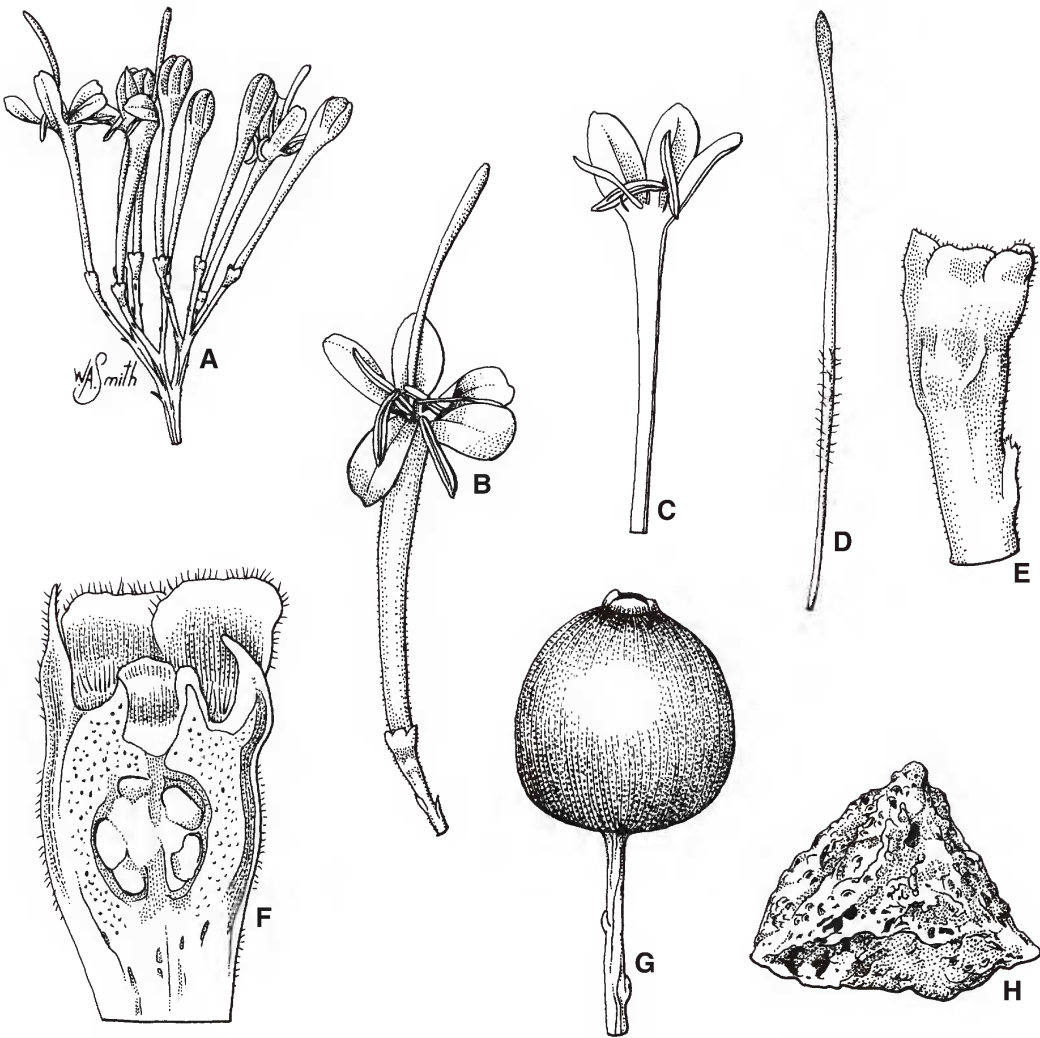


Fig. 1. *Tarenna dallachiana* subsp. *expandens*. A. branch of inflorescence $\times 1$. B. flower $\times 2$. C. longitudinal section of flower $\times 2$. D. style and stigma $\times 2$. E. calyx with bracteole $\times 8$. F. longitudinal section of ovary showing ovules on placenta $\times 16$. G. fruit $\times 4$. H. seed $\times 12$. All from *Booth R241* (BRI). Del. W. Smith.

Specimens included here that were collected from the Annan and Claudie Rivers appear to be quite distinct. They differ from the others in their smaller usually broad elliptic leaves, glabrous leaves and branchlets and a slightly different aspect. All of these specimens seen are in fruit and their affinities are unclear at this time.

1b. *Tarenna dallachiana* subsp. *expandens* (F.Muell.) S.T.Reynolds & P.I.Forst. **comb. et stat. nov.**; *Webera expandens* F.Muell., *Fragm.* 6: 25 (1867); *W. dallachiana* var.

expandens (F.Muell.) F.Muell., *Fragm.* 9: 187 (1875); *Ixora expandens* (F.Muell.) F.Muell., *Syst. Census of Australian Plants* 1:74 (1882); *Tarenna expandens* (F.Muell.) S.Moore, *J. Bot.* 64: 94 (1926). **Type:** Northern Territory. Adam's Bay, date unknown, *Hulls s.n.* (holo: MEL 1533300 [flowering specimen]).

Tarenna foliosa S.Moore, *J. Bot.* 64: 94 (1926). **Type:** Northern Territory. Groote Eylandt, Feb 1925, *S. Moore 116* (holo: BM [flowering specimen]), **syn. nov.**

Distinguishing characters as given in the key above. **Fig. 1.**

Selected specimens examined: Western Australia.

11 km N of King Cascade, 15° 31'S, 125° 19'E, Jun 1987, *Kenneally 10556 & Hyland* (BRI, PERTH). **Northern Territory.** Goromuru River floodplain, 12° 37'S, 136° 14'E, May 1992, *Cowie 2843* (BRI, DNA); Magela Creek upper Catchment, 12° 49'S, 133° 00'E, Apr 1995, *Cowie 5659 & Brennan* (DNA); Daly River, 13° 42'S, 130° 33'E, Sep 1975, *Dunlop 3595* (DNA); Garden Point, Melville Island, Sep 1977, *Dunlop 4622* (BRI, CANB, DNA); Arnhem Land, Mt Permain, 11° 56'S, 132° 58'E, Oct 1987, *Dunlop 7023* (BRI, DNA); Upper Goomadeer River, 12° 40'S, 133° 34'E, Oct 1987, *Dunlop 7227 & Munns* (BRI); 5 km SE Lake Eames, Vanderlin Island, 15° 42'S, 137° 04'E, Aug 1988, *Latz 11079* (BRI); Headwater Springs, Green Ant Creek, 13° 30'S, 131° 14'E, Mar 1989, *Leach 2547 & Dunlop* (BRI); Melville Island, Yapilika tributary of Maxwell Creek, 11° 33'S, 130° 35'E, Jan 1992, *Leach 2952 & Cowie* (BRI, DNA); Little Angurugu River, Groote Eylandt, Sep 1973, *Levitt 353* (DNA); Nourlangie Rock area, 12° 57'S, 132° 50'E, Nov 1972, *McKean B774* (DNA); Darwin, Feb 1961, *McKee 8263* (BRI, MEL, NSW); Hapgood River, Gapuwuyak, 12° 37'S, 135° 50'E, Sep 1987, *Russell-Smith 3432 & Lucas* (BRI, DNA); Bathurst Island, Pimaroo Creek, 11° 23'S, 130° 22'E, Jun 1988, *Russell-Smith 5783 & Lucas* (BRI, DNA); 19 km E Jabiru, 12° 37'S, 133° 03'E, Apr 1989, *Russell-Smith 8020* (DNA); Mt Brockman, Kakadu National Park, 12° 50'S, 132° 54'E, Apr 1989, *Russell-Smith 8063 & Lucas* (BRI, DNA); Adelaide River crossing, Daly River road, 13° 30'S, 131° 04'E, Dec 1990, *Russell-Smith 8372 & Lucas* (BRI, CANB, DNA, K, MEL). **Queensland.** COOK DISTRICT: 30.9 km from the beach at Ussher Point on the track to the main Peninsula road, 11° 05'S, 142° 35'E, Jul 1992, *Clarkson 9689 & Neldner* (BRI); Weipa Concession, N bank of Mission River, Sep 1974, *Dockrill 882* (BRI, QRS); Andoom Bridge area, near Weipa, Jan 1989, *O'Reilly 110* (BRI); 11.5 km N of Weipa Mission, 12° 35'E, 141° 54'S, Dec 1974, *Specht & Salt W113* (BRI).

Distribution and habitat: Northern tropical Australia from around Darwin to Arnhem Land in the Northern Territory and near Weipa, on Cape York Peninsula, Queensland. There is a single (sterile) collection from Western Australia in Prince Regent Nature Reserve. Plants usually grow at the edge of swamps, mangroves and semi-deciduous vine forests, near permanent water (*viz.* spring fed soakage pockets along creeks and drainage lines and creek line) on gorges and sandstone ridges, on sandy clay loam (**Map 1**).

Notes: Mueller (1867) described *Tarenna expandens* (as *Webera expandens*) as a distinct

species but later reduced it to a variety of *Webera dallachiana* (Mueller 1875). Intraspecific rank for *T. expandens* is maintained here, because although the types of these names are quite different they are connected by intermediate forms, particularly on northern Cape York Peninsula. Recent checklists of the Northern Territory flora have listed this subspecies as simply *T. dallachiana* (Dunlop 1987; Liddle *et al.* 1994).

Tarenna dallachiana subsp. *expandens* is characterised and distinguished from *T. dallachiana* subsp. *dallachiana* by hairy branchlets and leaves (especially velvety young leaves), usually greenish or greenish brown colour of dried leaves (the green colour usually persisting in the herbarium for a very long time), flowers with long very slender corolla tubes and long pedicels. This subspecies varies greatly in the shape and size of leaves and inflorescences, hairiness of leaves and branchlets, colour of dried leaves, and the number of nerves.

Several forms are distinguishable in the specimens available for study. The typical form is represented by specimens from around Darwin and Melville Island. They resemble the type specimen of *T. expandens* in their short, broadly elliptic or elliptic-oblong leaves which are usually broad and obtuse at the base, finely hairy on their lower surface and usually dry greenish or greenish brown.

Specimens from eastern Arnhem Land and the islands of the Gulf of Carpentaria are variable in their leaves. Some of these with larger, hairier leaves resemble the type of *T. foliosa* (this species now combined under this subspecies), whereas those with relatively narrower leaves are not unlike those from northern Queensland (*viz.* Bamaga, Rex Range), except that their young leaves are velvety, lateral nerves more oblique, and their petioles longer.

The following collections *viz.* *Dunlop 3595* from Mt Permain, Arnhem Land, *Russell-Smith 8020* from East Jabiru, *Dunlop 7227 & Munns* from Upper Goomadeer River, and *McKean B774* from Nourlangie Rock probably represent a distinct form but specimens are inadequate to ascertain this at the present. The specimens differ from the other collections of

this variety in their hairier, usually smaller, elliptic leaves (10–17 (–19) × 3–4.4 (–7) cm), which are usually narrow at both ends (mostly acuminate or acute at apex, acuminate and decurrent into a long petiole at base); comparatively greater number of nerves ((9–) 10–14 pairs) on each leaf, usually very oblique nerves; longer petioles (1.5–5 cm long), and 8–16-seeded fruits.

Conservation status: *Tarenna dallachiana* subsp. *expandens* is widespread and not threatened. It is present in Kakadu National Park in the Northern Territory and Prince Regent Nature Reserve in Western Australia.

Etymology: The subspecific epithet is derived from the Latin word *expansus* (expanding), but the application is obscure.

2. *Tarenna monticola* S.T.Reynolds & P.I.Forst. **sp. nov.** a *T. dallachianae* (F.Muell. ex Benth.) S.Moore floribus pedicellis que brevioribus, corollis glabris, fructibus 14–26–seminalis, foliis apice acuminatis domatiis prominentibus pubescentibus differt. **Typus:** Queensland. COOK DISTRICT: Riflemead Forest Reserve, 2.2 km along Mt Lewis road from Bushy Creek bridge, 16° 34' S, 145° 18' E, 5 December 2002, *A. Ford AF3781* & *J. Holmes* (holo: BRI [2 sheets + spirit]; iso: QRS [1 sheet + spirit]; K, L, NSW to be distributed).

Tarenna sp. (Mt Lewis B.P.Hyland 3403) (Reynolds 1997: 184; Forster & Halford 2002: 177)

Small slender trees to 16 m; young parts especially young leaves densely finely hairy; branchlets with fine appressed hairs at their tips only. Leaves petiolate; lamina elliptic, abruptly narrowing at both ends, apex usually long-acuminate at apex, base acute or acuminate and decurrent into the petiole, 11.5–19.5 (–22) × 5–8.5 cm, thinly coriaceous, dries greenish, greyish or darkish brown with whitish or reddish nerves; upper surface dullish, glabrous, lower surface sparsely appressed hairy on the midrib and usually with prominent domatia in the axils of the main nerves; midrib sunken above; lateral nerves 8–11 pairs, suboblique and ascending at their tips; petioles 1–3 cm long. Stipules deltoid, long acuminate or aristate at apex and

thinner at margins, 8–9 × 4.5–5 mm, appressed hairy outside, sometimes viscid inside. Inflorescences trichotomously branched, densely flowered; peduncles with short patent hairs; lowermost branch (lateral) 1.8–3 cm long, 29–64-flowered; bracts lanceolate or very narrowly ovate; bracteoles 2 or 3 per pedicel (one at base of calyx), narrowly ovate or slightly subulate, usually ciliolate. Flowers glabrous; pedicels (1–) 2–5 mm long, puberulous. Calyx 2.5–3.5 × c. 2 mm, glabrous or lobes sometimes subglabrous; calyx lobes prominent, ovate, obtuse, 0.8–1 × 0.5–0.8 mm. Corolla 8–12.5 mm long, glabrous or rarely subglabrous outside, sparsely appressed hairy inside; corolla tube 4–7 mm long, dilated gradually to mouth, 1.5–2.5 mm wide at mouth, c. 1.5 mm wide at base; corolla lobes 2.5–4 × c. 2 mm, oblong, obtuse, reflexed. Stamens exserted with filaments to 1.5 mm long and anthers 3.5–5 mm long. Style and stigma 15–20 mm long, exserted, with exserted part (from mouth of corolla tube) 6–10 mm long; style sparsely long hairy in the upper half; stigma fusiform c. 2 mm long; ovules 7–13 in each loculus of the ovary, impressed on the fleshy placenta which is attached to the septum. Fruits 4–5 × 5–6 mm, subglobose, (14–) 20–26-seeded; seeds very small, angular, reticulate; fruit stalk 4–7 mm long. **Fig. 2.**

Selected specimens examined: Queensland. COOK DISTRICT: Copper Lode Falls Dam area Cairns, Dec 1972, *Birch 93* (BRI); T.R. 66, 5.5 km along Mt Lewis road, 16° 35' S, 145° 18' E, Nov 1998, *Forster PIF23995 et al.* (BRI); Mt Misery road, East Normanby River, 15° 52' S, 145° 12' E, Nov 2000, *Forster PIF26485 et al.* (A, BRI, MEL, NSW); S.F.R. 143, Windmill L.A., 16° 33' S, 145° 15' E, Nov 1978, *Gray 1067* (BRI, QRS); [S.]F.R. 1073, 16° 45' S, 145° 30' E, Dec 1961, *Hyland 2208* (BRI); Mt Lewis, T.R. 130, Leichhardt L.A., c. 40 miles (64 km) W of Cairns, Dec 1964, *Hyland 3403* (BRI); Kuranda, 16° 49' S, 145° 38' E, Jul 1959, *Jones 1286* (BRI, CANB); Clohesy River (cult. Tolga), Dec 1991, *Sankowsky 1366* (BRI); 3 miles W of Rumula, Mt Lewis range, Oct 1964, *Schodde 4144* (BRI, CANB); S.F.R. 310, Cpt. 21, 17° 15' S, 145° 40' E, Dec 1961, *von Altena 2203* (BRI). NORTH KENNEDY DISTRICT: Bluewater State Forest, 55 km NW of Townsville, 19° 13' S, 146° 25' E, Nov 1991, *Bean 3798* (BISH, BRI, LAE); Mt Fox, Nov 1949, *Clemens s.n.* (BRI [AQ716419]); 18 km W of Bruce Highway, along Forestry road, Bluewater Creek, S.F., Paluma Range, 19° 14' S, 146° 25' E, Nov 1991, *Halford Q681* (BISH, BRI, K, L, MEL, QRS).



Fig. 2. *Tarenna monticola*. A. flowering branch $\times 0.5$. B. branch of inflorescence in detail $\times 2$. C. flower $\times 4$. D. longitudinal section of flower $\times 4$. E. style and stigma $\times 4$. F. anther $\times 8$. G. calyx tube with bracteoles $\times 8$. H. longitudinal section of ovary showing ovules on placenta $\times 16$. I. stipule $\times 4$. A from *Sankowsky s.n.* (BRI[AQ565519]); B-I from *Halford Q681* (BRI). Del. W. Smith.

Distribution and habitat: Northeast Queensland from Windsor Tableland in the north to the Paluma Range in the south. Plants grow in rainforests (complex notophyll vineforest), usually at high altitudes (480–880 m altitude) on substrates derived from basalt and metamorphics (**Map 2**).

Notes: *Tarenna monticola* is readily recognisable from the other two species enumerated here, by the small domatia in the angle between the main lateral veins and the midrib on the lower surface of its leaves, coarser nerves, usually acuminate leaf apex, glabrous inflorescences, short pedicels, and glabrous corolla. Juvenile foliage is densely hairy, but this is not so evident in adult foliage. *Tarenna monticola* also differs from *T. dallachiana* by its narrower calyx lobes, shorter corolla, and greater number of seeds (14–26 seeds in each fruit).

Conservation status: *Tarenna monticola* is widespread and not threatened. It is present in Paluma & Lake Eacham National Parks and a number of Forest Reserves and State Forests.

Etymology: The specific epithet refers to the usual habitat of this species, from the Latin words *monti* (mountain) and *cola* (dweller).

Tarenna subgenus **Pseudoixora** (Hook.f.) S.T.Reynolds **comb. et stat. nov.**; *Webera* sect. *Pseudoixora* ('*pseudixora*') Hook.f., *Fl. Brit. India* 3: 104 (1882). **Type:** not designated.

Tarenna sect. *Pauciovulatae* Valeton, in Lauterbach, *Beitr. Fl. von Papuasien* 13, *Bot. Jahrb.* 60: 85 (1924). **Type:** not designated.

Notes: This subgenus differs from typical *Tarenna* by its solitary ovule or seed in each cell of the ovary and fruit, and by its large, \pm smooth, subglobose *Ixora*-like seed which is dorsally rounded and provided with a thick-rimmed circular excavation on its ventral side. However, its inflorescence, subulate bracteoles on the pedicels, stipules and branchlets are similar to those of subg. *Tarenna*. Bakhuizen van den Brink Jr. (1975: 47) recognised sect. *Pseudoixora* under *Tarenna* Gaertn. but did not make a formal combination.

Distribution: This subgenus is present in northern Australia (*T. pentamera*), New Guinea (e.g. *T. guelcheriana* Valeton and *T. warburgiana* Valeton), south-east Asia (e.g. *T. curtisii* F.N.Williams), Mauritius in the Indian Ocean (*T. richardii* Drake ex B. Verdcourt) and Africa (Bridson 1979).

Etymology: Hooker (1882) was apparently referring to the *Ixora*-like seeds when he named this subgenus (as sect. *Pseudoixora* ('*Pseudixora*').

3. Tarenna pentamera (Benth.) S.T.Reynolds **comb. nov.**; *Ixora pentamera* Benth., *Fl. Austral.* 3: 416 (1867). **Type:** Northern Territory. Cavern [Chasm] Island, off Groote Eylandt, 14 January 1803, R. Brown 3445 (lecto [here designated]: BM; isolecto: K, CANB, MEL).

Tarenna sp. A (Koch 1992: 929).

Shrubs or trees 2–8 m tall; bark light brown or greyish brown; branchlets greyish, \pm 4-gonous towards apex, densely hairy with short spreading hairs, subglabrous or glabrous. Leaves petiolate; lamina elliptic, narrowly elliptic or elliptic-ovate, apex acute or shortly acuminate, base subacute and decurrent into the petiole, sometimes suboblique, (5.5–) 8.5–15 (–18.5) \times (2–) 3–5 (–6.3) cm, coriaceous, drying greenish to darkish-brown, glossy above; upper surface glabrous or sparsely hairy, lower surface densely hairy or only the nerves finely hairy, usually with small hairy tufts in axil of the main nerves; midrib sunken above, lateral nerves 8–12 pairs, slightly oblique or \pm arcuate, impressed above; petioles 1.2–3.1 cm long, slender, channelled above, finely hairy or glabrous. Stipules free or slightly connate (near base), ovate or triangular, 5.5–7 \times 2.5–3 mm, keeled, aristate (especially in young plants), paler at margins, finely and sparsely appressed hairy on outside, glabrous inside; colleters present at the base inside. Inflorescences trichotomously branched corymbiform panicles 4.5–7 cm long; centre branch with (1–) 2 or 3 internodes; lateral branches 2.5–7.5 cm long, 17–22-flowered; bracts ovate, sometimes very small and only represented by thick subulate lateral lobes. Flowers perfumed; pedicels 1–4 mm long; bracteoles 1 or 2 on each pedicel,

alternate, minute, narrowly ovate or subulate. Calyx cyathiform, dilated to a broad limb, 2–2.5 mm long, densely adpressed hairy outside; tube *c.* 1 mm long and *c.* 1 mm wide at mouth, with limb about 1 mm long; lobes small, *c.* 0.5 × 0.7 mm, hemispherical. Corolla white; tube infundibuliform, 2–3.5 mm long, dilated near mouth (1.5–2 mm wide at mouth), glabrous outside, densely hairy at throat; lobes longer than tube, 4.5–6 × 1.5–2 mm, obovate, obtuse, reflexed. Stamens exerted, filaments 0.7–1 mm long, anthers as long as or longer than corolla lobes, 3.5–5 mm long, usually with a prolonged acute apical connective; ovules solitary in each cell of the ovary, attached to the septum. Style with stigma 7.5–9 mm long, stigma thick, elongate, ± clavate. Fruits purple black when ripe, subglobose, 5–6 × 5.5–6 mm, sometimes ribbed when dry, 2-seeded; seeds solitary in each locule, subglobose, rounded on top, flat below and provided with a circular thickly rimmed hilar cavity in the centre, smooth or finely and obscurely reticulate on its dorsal side. **Fig. 3.**

Selected specimens examined: **Western Australia.** Fenelon island, 14° 08'S, 125° 42'E, Jul 1977, *Kenneally 6384* (PERTH); Lone Dingo, 14° 03'S, 125° 43'E, Jan 1982, *Kenneally 7839* (BRI, QRS, PERTH); 5.9 km E of Mt Waterloo, 15° 19'S, 125° 07'E, Jun 1987, *Kenneally 10480 & Hyland* (CANB, PERTH); Mama Falls, 5 km E of Kalumburu on edge of escarpment, 14° 18'S, 126° 41'E, Dec 1992, *Mitchell 2796B* (BRI, PERTH). Sir Graham Moore Island, 13° 56'S, 126° 33'E, Jul 1973, *Wilson 11250* (PERTH). **Northern Territory.** Popham Bay, Cobourg Peninsula, 11° 16'S, 131°50'E, Jun 1983, *Bardsley s.n.* (DNA 27284); Bickerton Island, 13° 46'S, 131° 50'E, Jun 1985, *Clark 112 & Wightman* (DNA); N Coombe Point, Mountnorris Bay, 11° 26'S, 132° 47'E, Oct 1992, *Cowie 3228* (BRI, DNA); Castlereagh Bay, Dhipirrinjura Outstation, 12° 15'S, 135° 05'E, Aug 1995, *Cowie 5978* (BRI, DNA); Crocodile Island, NW of Milingimbi, 12° 00'S, 134° 50'E, Dec 1998, *Cowie 8138 & Harwood* (BRI, DNA); Wurrmalmirr Creek, Elcho Island, 11° 58'S, 135° 37'E, Jul 1975, *Dunlop 3851* (BRI, CANB, DNA); Gunn Point, 12° 12'S, 131° 01'E, Nov 1989, *Forster PIF5926 & Russell-Smith* (BRI, DNA); 6 km S Brogden Point, Murgengella, 11° 34'S, 133° 04'E, Mar 1987, *Russell-Smith 1994 & Lucas* (CANB); 5 km south Snake Bay, Melville Island, 11° 28'S, 130° 41'E, Apr 1987, *Russell-Smith 2081 & Lucas* (BRI, DNA); Groote Eylandt, Angurugu, 13° 59'S, 136° 28'E, Jul 1987, *Russell-Smith 2873 & Lucas* (DNA); NE of Port Bradshaw, Gove, 12° 27'S, 136° 49'E, Sep 1987, *Russell-Smith 3371 & Lucas* (DNA); Melville Island, Rangani Creek, 11° 18'S, 130° 31'E, Jun 1988, *Russell-Smith 5757 & Lucas* (BRI, DNA); Conder Point, Melville Island, 11° 44'S, 131° 17'E,

May 1989, *Russell-Smith 8067 & Lucas* (BRI, DNA); Gunn Point, 12° 10'S, 131° 05'E, Dec 1989, *Russell-Smith 8175 & Lucas* (BRI, DNA); Yirrkala, 12° 12'S, 136° 47'E, Aug 1948, *Specht 938* (BRI, MEL); West of mouth of West Alligator River, 12° 12'S, 132° 15'E, May 1978, *Webb & Tracey 12257* (BRI, DNA, QRS); NE Coast of Cape Van Diemen, Melville Island, 11° 10'S, 130° 22'E, May 1978, *Webb & Tracey 12478* (CANB).

Distribution and habitat: Northern Australia with a chiefly coastal distribution from the Mitchell Plateau, Western Australia, to the Gulf of Carpentaria, Northern Territory and on offshore islands; usually in deciduous vine thickets on coastal dunes (**Map 2**).

Notes: *Tarenna pentamera* is characterised by hairy young branchlets and leaves (especially lower surface of leaves), acute or acuminate leaf apex, subulate bracteoles on the pedicels, flowers with fairly short and wide corolla tubes which are shorter than its lobes, and by its 2-seeded fruits with a large solitary subglobose seed in each locule of the fruit. It resembles *T. asiatica* in its inflorescence, the shape of the corolla and subulate bracteoles, but differs by its solitary ovule or seed in each cell of the ovary or fruit, attachment of the ovule, and by its subglobose seed. It differs from the other Australian species of *Tarenna* by its short corollas and large subglobose solitary seed in each cell of the fruit. In the other species, the corolla tube is usually very long and much longer than its lobes, and the seeds are small and numerous (more than 4) in each cell of the fruit, angular, and densely conspicuously reticulate.

Typification: Several sheets of the type collection (*Brown 3445*), are available for study, the sheet at BM which consists of both flowering and fruiting specimens is here chosen as lectotype of this species name, the isolectotype at CANB has flowers only, whereas the isolectotypes at K and MEL are fruit only. Two labels are present on the BM sheet, one bears the following annotation, presumably made by Brown, "Cavern Island and island 91(?), island 3 (?), No 17 spec.", whereas the other is typed "Cavern Island and other islands near Groote Eylandt, 14 January 1803". In his manuscript, Brown cited "Carpentaria, small island adjoining Cavern Island", date of collection 14 January 1803. According to Specht



Fig. 3. *Tarenna pentamera*. A. flowering branch $\times 1.2$. B. flower $\times 5$. C. longitudinal section of flower showing a solitary ovule and anthers $\times 4$. D. longitudinal section of ovary showing more detail of solitary ovule. $\times 8$. E. anther. $\times 8$. F. style and stigma $\times 6$. G. seed $\times 5$. All from Cowie 3228 (BRI). Del. W.Smith.

(1958: 2) Brown visited Chasm Island, off Grootte Eylandt, on that date. Vallance (1990) stated that between the 5th and 17th of January 1803, Brown visited Chasm and Finch Island and more recently Vallance *et al.* (2001) have categorically stated that “Brown lands on Chasm Island” on 14 January 1803. Hence it seems reasonable to assume that Brown’s “Cavern” island is now Chasm island (13° 40’ S, 136° 35’ E).

Conservation status: *Tarenna pentamera* is widespread and not threatened. It has not been collected from any conservation reserves.

Etymology: The specific epithet is from the Greek *pent* (five) and *merus* (parts) and alludes to the perianth parts.

Triflorensia S.T.Reynolds **genus nov.** arte affinis *Tarennae* Gaertn. a quo inflorescentia ramis florentibus quibusque trichotomo ramosis instructa in cymis dichasiali 3-flora terminentibus vel floribus (praecipue lateralibus) tribus ramis quibusque in cyma 3-flora plerumque substitutis, bracteolis basi breviter connatis, bracteolis binatis, floribus plerumque 4-meris, stipulis obtusis plerumque tenuibus, ramulorum ramificatione supra-axillare differt. **Typus:** *Triflorensia australis* (Benth.) S.T.Reynolds (= *Diplospora australis* Benth.)

Shrubs or small trees; branchlets pale brown or greyish with flaky bark (young ones resinous), trichotomously branched, the central axis usually with supra-axillary branching (that is the branchlet is branched (with three branches) at some distance above the last node and not at the node itself, and often provided with a long internode between the upper trichotomous branches and last node). Leaves entire, coriaceous, drying darkish; petiolate. Stipules connate from middle down or connate only towards the base with lobes broadly ovate, obtuse or slightly rounded at apex, thin, slightly scarious at margins, keeled, occasionally provided with prominent, thick, rigid lateral awns and with colleters at base inside. Inflorescences terminal, trichotomously branched with the three branches either clustered at the apex of the branchlet or clustered on a short stalk subtended by the uppermost pair of leaves, each branch terminated by a triad (dichasial

cyme); all the flowers of the triad or only the lateral ones replaced by branches each terminated by a triad; branches often branched many times, with middle branch of the main inflorescence sometimes provided with 1 or 2 internodes, and terminated by 3 branches each with a triad at its apex; lateral branches of the inflorescence patent, sometimes 3-branched at their apex, each branch terminated by a triad; bracts persistent, those subtending the inflorescence stipule-like, connate, obtuse at apex and shortly sheathing at base, those at the upper junction of the trichotomous branches shortly connate with depressed ovate, slightly scarious, erose lobes, and usually provided with long or short, thick, rigid, lateral awns; colleters present at base inside. Flowers bisexual, 4 (or 5)-merous; middle flower of the triad usually sessile, lateral flowers pedicellate; bracteoles small, paired, inserted on either side of the calyx tube, ovate, erose at margins. Calyx turbinate, with limb wider and thinner, 4 or 5-lobed; lobes imbricate, thin, hemispherical, eroded at margins and usually ciliolate. Corolla tube infundibuliform, slightly shorter than the lobes; hairy or glabrous inside; corolla lobes 4 (or 5), twisted to the left in bud, longer than the tube, oblong, obtuse at apex, hairy from about middle to the base inside, glabrous outside. Stamens 4 (or 5); anthers introrse, narrowly ovoid-ellipsoid, with a short apical lobe, thicker towards the middle (near suture of the lobes), dorsifixed; filaments very short, usually inserted below apex of the corolla tube; pollen grains 3-colporate; disc fleshy, annular. Ovules 2 in each cell of the ovary, attached to the septum; style slender, as long as corolla tube; stigma shortly exceeding the corolla tube, fleshy, lanceolate, with 2 erect lobes at apex. Fruits globose, green turning black when ripe, smooth; endocarp crustaceous, thin, shiny, pale brown; seeds two (very rarely one) per locule, hemispherical-angular, smooth and rounded on top, slightly angular on its sides, flat and with a subcircular or elliptic excavation in the centre on its ventral side.

Distribution: This genus is currently endemic to Australia where it is represented by three species. It is probably also in New Caledonia as *Tarenna microcarpa* (Guillaumin) Jérémie (Jérémie 1974) from that country resembles *Triflorensia australis* in its seeds.

Notes: *Triflorensia* is characterised by its three inflorescence branches which are apically clustered at the branchlet tip or on a short stalk; each branch is terminated by a three-flowered dichasium, the middle flower of the triad usually sessile, the lateral ones stalked, the lateral flowers or all three flowers usually replaced by 3 branches each, these often branching again and ultimately terminated by a triad; connate ovate bracts, which are shortly sheathing at base, and provided with long or short, rigid, lateral awns; 4 (or 5) -merous flowers; paired, small bracteoles (one on each side of the calyx); thick, lanceolate stigma usually with 2 erect lobes at apex; small, 4 (rarely 3) -seeded fruits; slightly angular seeds which are rounded on top, angular on its side, and with a subcircular excavation on its flat ventral side; obtuse thin stipules, and supra-axillary branching (that is the central branch (of the three branches of the branchlet) usually branched (with 2 lateral branches) at some distance above the last node instead of at the node itself; the distance from last node to where the upper three branches of the branchlet diverge is between 5-30 mm long).

Triflorensia differs from *Tarenna* in the 2 ovules or seeds in each cell of the ovary or fruit; hemispherical seeds which are rounded on top and angular on their sides; inflorescence branches terminated by a triad (the middle flower

the oldest and usually sessile, the laterals pedicellate); connate bracts (connate near base and often provided with lateral awn-like lobes); stipules thin, usually obtuse; and the supra-axillary branching of the primary branch of the branchlet.

Earlier workers such as J.D.Hooker have indicated that *Diplospora australis* Benth. was wrongly placed in the genus *Diplospora* (he had determined the type specimen of this species at K, ‘certainly not *Diplospora*’), and another worker (hand writing appears to be that of ? W. Francis from BRI) had determined the same collection as ‘*Stylocoryne*’ (now under *Tarenna*). *Diplospora australis* and the two other Australian species remained under the name *Diplospora* (e.g. Bailey 1900; White 1926; Ross 1986) until Ali and Robbrecht (1991) transferred them to *Tarenna* Gaertn. and made the following combinations *viz.* *Tarenna australis* (Benth.) Ali & Robbr., *Tarenna cameroni* (C.T.White) Ali & Robbr., and *Tarenna triflora* (Benth.) Ali & Robbr. *nom. illeg.* (see under *Triflorensia ixoroides*).

Etymology: The name of the genus alludes to the three branches of the inflorescences, each of which are terminated by a triad, the three flowers of the triad often replaced by 3 branches each terminated by a triad.

Key to the species of *Triflorensia*

1. Inflorescences usually small, the three branches terminated by a 3-flowered dichasium, or the flowers of each triad usually replaced by three stalked triads, the flowers of these are occasionally replaced by 3 branches each terminated by a triad, the whole inflorescence ultimately (3–) 7–13(–25)-flowered, internodes rarely present in the central branch; middle flower of the triad sessile, laterals stalked; peduncles and young branchlets usually with sparse short hairs; leaves 2–4.5 (–6) × 0.6–1.8 (–2.7) cm **3. *T. ixoroides***
- Inflorescences usually larger, the three flowers of each branch of the inflorescences usually replaced by three branches each terminated by a triad, the branching often repeated many times, the main branch (central branch) of the inflorescence usually with one or two internodes, the whole inflorescence ultimately (9–) 15–53-flowered; middle flower (of the 3-flowered cyme) sessile or shortly stalked, laterals stalked; peduncles and young branchlets glabrous or sparsely hairy; leaves 5–10 (–12.5) × 1.7–4.2cm 2
2. Inflorescences 27–53-flowered, peduncles glabrous or sparsely hairy; middle flower of the 3-flowered cymes sessile; lateral flowers stalked (pedicels 1–

1.5 mm long); flowers mostly 4-merous; leaves (5–) 7–10 (–12.5) × 1.7–3.5 (–4.2) cm; petioles 5–12 mm long; fruits globose, 6–10 × 7–10 mm **1. *T. australis***
 Inflorescences 9–27-flowered, peduncles glabrous; all 3 flowers of the cyme usually stalked; pedicels 2.5–3 mm long, shorter in the middle flowers; flowers mostly 5-merous; leaves 5.5–7.2 × (1.8–) 3.2–4.2 cm; petioles 10–15 mm long; fruits ellipsoid or ellipsoid ovoid, 8–9.5 × 6.5–7 mm **2. *T. cameronii***

1. *Triflorensia australis* (Benth.) S.T.Reynolds
comb. nov.; *Diplospora australis* Benth.,
Fl. Austral. 3: 413 (1867); *Tarenna*
australis (Benth.) Ali & Robbr., *Blumea*
 35: 302 (1991). **Type:** Queensland, Cape
 York, *W. Hill 39* (lecto [here designated]:
 K).

Illustrations: Hyland *et al.* (1999, 2003).

Small trees or shrubs 2–6 m high; branchlets pale brown or pale greyish brown; young branchlets and inflorescences sparsely hairy or glabrous. Leaves petiolate; lamina elliptic, subacute or obtuse at apex, subacute and attenuate into petiole at base, 5–10.2 (–12.5) × 1.7–3.5 (–4.2) cm, coriaceous, thickened at margins; midrib raised and deeply channelled above; lateral nerves 5 or 6 (–8) pairs, suboblique or subpatent, looping at margins; distinct both surfaces; reticulate veins not apparent; domatia absent; petioles 5–12 mm long; stipules shortly sheathing near its base and provided with 2 lateral thick rigid awns, lobes usually thin, broadly ovate, rounded or obtuse, obscurely keeled. Inflorescences 1.5–3.5 × 1.7–2.5 cm, peduncles glabrous or subglabrous, the 3 branches usually clustered on short stout peduncles (this 3–6 mm long (10 mm long in fruit)), each branch 3–13 mm long, terminated by a 3-flowered dichasial cyme (the middle flower of the dichasium sessile, laterals stalked), all the flowers or only the lateral flowers of the triad replaced by 3-branches each terminated by a triad, the three flowers of each are again replaced by three branches each with a triad, this is repeated many times, the whole inflorescence ultimately 27–53-flowered; the central branch of each inflorescence with 1 or 2 internodes, these 5–13 mm long; lateral branches without internodes, with the lowermost branch 7–18-flowered; stalk of ultimate cymes 1–2 mm long; bract at the base of the three main branches of the inflorescence, stipular, slightly sheathing and sometimes provided with lateral rigid awns, whereas bracts on upper branches

small, and usually without awns. Flowers 4-merous; central flower sessile; lateral flowers stalked (pedicels 1–1.5 mm long); bracteoles ovate, obtuse; calyx 1.5–2 × 1.5–2 mm. Calyx lobes hemispherical, *c.* 0.5 × 1 mm, erose at margins and ciliolate. Corolla infundibuliform, 5–6 mm long, white; tube 2–2.5 × 2.5 mm, hairy inside, with the hairs denser towards the mouth; lobes subpatent, 3.5–4.5 mm long, oblong, obtuse, hairy from about middle down. Anthers spreading, 3–4 mm long, dorsifixed towards the base; filaments *c.* 0.5 mm long; disc fleshy shorter than calyx limb. Style and stigma 6–7 mm long, style sparsely hairy; stigma thick, as long as the anthers, slightly exceeding the corolla tube. Fruits globose, 6–10 × 7–10 mm; stipe 4–6 mm long. **Fig. 5.**

Selected specimens examined: Northern Territory. 10 miles (16 km) NE Mudginberry Homestead, 12° 36'S, 132° 52'E, Jul 1972, *Byrnes 2736* (CANB, DNA); W side of Gunn Point, Nov 1990, *Cowie 1417 & Dunlop* (BRI, DNA, NSW, QRS); East Alligator River, 10 km S of Cannon Hill Ranger Station, 12° 27'S, 132° 58'E, May 1980, *Craven 6004* (CANB, DNA); Gunn Point, 12° 12'S, 131° 00'E, Apr 1984, *Dunlop 6676* (DNA); Wessel Islands, 11° 10'S, 136° 44'E, Sep 1974, *Latz 3311* (BRI, DNA); Marchinbar Island, Wessels, 11° 23'S, 136° 35'E, Dec 1987, *Russell-Smith 4476 & Lucas* (BRI, DNA, QRS); Kakadu N.P., 4 km W of Hill 301, 12° 31'S, 132° 57'E, Jun 1988, *Russell-Smith 5682 & Lucas* (BRI, DNA); 19 km E Jabiru, 12° 37'S, 133° 03'E, Apr 1989, *Russell-Smith 8053* (BRI, DNA); 12 km E of Mudginberri Homestead, Kakadu N.P., 12° 35'S, 132° 59'E, Jan 1991, *Russell-Smith 8401 & Brock* (BRI, DNA); Kakadu National Park, Ngarradj, 12° 29'S, 132° 55'E, Jan 1992, *Russell-Smith 8569 & Lucas* (BRI). **Queensland.** COOK DISTRICT: Mapoon, Jul 1901, *Bailey s.n.* (BRI [AQ124224]); Coast, Mt Bremer, 26 km NE of Bamaga, 10° 42'S, 142° 31'E, Feb 1994, *Fell DGF3932 et al.* (BRI); 102 km NW of Coen, boundary of Archer Bend N.P. and Merluna Holding, 13° 20'S, 142° 29'E, Jun 1994, *Fell DGF4420 & Buck* (BRI, DNA, QRS); 28 km along road to Leo Creek Mine, McIlwraith Range, 13° 42'S, 143° 17'E, Jun 1992, *Forster PIF10047 & Tucker* (BRI, MEL, QRS); Mary Valley Scrub, 15° 02'S, 143° 45'E, Jul 1993, *Forster PIF13443 et al.* (BRI); Bolt Head, Temple Bay, 12° 15'S, 143° 05'E, Jun 1996, *Forster PIF19392* (BRI); Kroll Creek Holding – Parish of Kesteven, 13° 43'S, 143° 14'E, Mar 1982, *Hyland*

11770 (BRI, QRS); T.R. 14, Parish of Kesteven, 13° 43'S, 143° 18'E, Apr 1993, *Hyland 14744* (BRI, QRS); Lankelly Creek road, McIlwraith Range, 13° 53'S, 143° 15'E, May 1995, *Hyland 15341* (BRI, QRS); Dauan Island, Torres Strait, 9° 25'S, 142° 32'E, Sep 1971, *Lawrie s.n.* (BRI [AQ3998]); Cape York, Oct 1849, Bot 495, *McGillivray s.n.* (K – residual syntype).

Distribution and habitat: *Triflorensia australis* is endemic to tropical, northern Australia where it has been collected from Arnhem Land in the Northern Territory and Cape York Peninsula and Torres Strait in Queensland. Populations are largely coastal and occur in vine thickets, often in the lee side of foredunes or coastal cliffs. Substrates are usually derived from sandstone or laterite (**Map 3**).

Typification: A lectotype is selected for the name based on the better of the two original syntypes at K.

Notes: *Triflorensia australis* is readily distinguishable from the other species by its larger leaves, and larger, usually branched inflorescences. It is also markedly allopatric in its distribution.

There is considerable variation in the leaves of the specimens available for study. Generally they are elliptic, and usually medium-sized in the majority of specimens seen (e.g. *Dunlop 6676*, *Cowie 1417* & *Dunlop*; *Hyland 5502* and *10857* resemble the syntypes). A few specimens have very small or larger leaves but are probably the result of phenotypic variation, rather than representing distinct forms, as they are connected by intermediates throughout their range. Specimens with small or narrow leaves (*viz. Byrnes 2736* and *Tracey 14645*) resemble *T. ixoroides* in their leaves, but that species differs by its very small inflorescences, whereas specimens with slightly larger leaves (*viz. Russell-Smith 5733* & *Lucas*; *Russell-Smith 8569* & *Lucas*), appear to have a slightly different aspect in their branching and leaves (with broader bases) and may be worthy of formal recognition.

Conservation status: This species is not considered threatened. It is present in Kakadu National Park in the Northern Territory and Archer Bend National Park in Queensland.

Etymology: The specific epithet is from the Latin word *australis* (southern) and pertains to the perceived unusual distribution at the time of description.

2. *Triflorensia cameronii* (C.T.White) S.T.Reynolds **comb. nov.**; *Diplospora cameronii* C.T.White, *J. Bot.* 64: 216–217 (1926). **Type:** Queensland. MORETON DISTRICT: Yarraman, October 1924, *M.A. Cameron Y63* (lecto [here designated]: BRI[AQ717032]).

Tarenna cameronii (C.T.White) Ali & Robbr., *Blumea* 35: 302 (1991).

Illustrations: Ali & Robbrecht (1991: 282); James (1992: 504); Hauser & Blok (1998: 296).

Small trees or shrubs to 4.5 m high; branchlets pale brown with thin flaky bark; young branchlets and inflorescence axes slightly viscid, glabrous. Leaves petiolate; lamina lanceolate, elliptic or broadly elliptic, obtuse or abruptly shortly acuminate at apex, obtuse or subacute and decurrent into the petiole at the base, 5.5–7.2 (–11.5) × 2–4.2 (–6.5) cm, coriaceous, drying dark brown, very glossy above, dull and pale brown below; midrib raised above, deeply channelled; lateral nerves 6–8 (–10) pairs, subpatent, looping at margins; reticulate venation not apparent; petioles 10–15 mm long. Stipules shortly connate, with lobes obtuse, thin and colleters present inside. Inflorescences *c.* 2.2 × 2.5 cm, with the 3 branches of the inflorescence clustered on a long or short main stalk (stalk 2–7 mm long), or clustered at apex of the branchlets, each branch 5–8 (–12) mm long, terminated by a triad; the 3 flowers often replaced by 3 branches each terminated by a triad, with the whole inflorescence to 27-flowered; lateral branches (3–) 7–15-flowered; central branch of the main inflorescence with 1 or 2 internodes, 5–10 mm long and 3-branched at apex; bracts shortly connate and provided with thick lateral awns, lobes broadly ovate, obtuse, (bracts at the base of the main 3-branched inflorescence occasionally with foliaceous lateral lobes, whereas those subtending the branches have narrow, scarious lobes). Flowers mostly 5-merous, middle flower of the cyme sessile or on short stalks (pedicels to 4 mm long); lateral flowers stalked (pedicels 2.5–4 mm long); bracteoles ovate, erose, *c.* 1 × 1.5 mm. Calyx 2–3.5 × 2.5–5 mm; limb thinner, 5-lobed; lobes

hemispherical, *c.* 1 × 1.7 mm. Corolla infundibuliform, 6–7 mm long, white; tube 2–2.5 × 3.5 mm long, glabrous inside; lobes oblong, obtuse, *c.* 4 × 3 mm, densely erect hairy, especially towards their base (near mouth of the tube), glabrous on the margins. Anthers narrowly ovoid, apiculate, *c.* 4 mm long; filaments *c.* 0.5 mm long. Style with stigma *c.* 7 mm long; style glabrous; stigma fusiform, slightly 2-lobed at apex. Fruits ellipsoid or ellipsoid-ovoid, 8–9.5 × 6.5–7 mm. **Fig. 4.**

Selected specimens examined: **Queensland.** MORETON DISTRICT: Yarraman, Dec 1924, *Cameron Y63* (BRI – residual syntype); Yarraman L.A., Compartment 7, Oct 1955, *District Forester s.n.* [*Cameron*] (BRI [AQ10267]); Yarraman, [S.F.]R. 289, Oct 1955, *District Forester s.n.* [*Cameron*] (BRI [AQ411508]); *loc. cit.*, Jan 1956, *District Forester s.n.* [*Cameron*] (BRI [AQ10266]); Russel's road, near Pine Mountain, 27° 32'S, 152° 43'E, Feb 1983, *Forster PIF1528 et al.* (BRI); 1.5 km SW of Mt Berryman, 27° 44'S, 152° 19'E, Feb 1991, *Forster PIF7769 & Sharpe* (BRI, QRS); Anduramba road, Biarra Range between Strange View and Barnes Hill, 27° 11'S, 152° 06'E, May 1990, *Grimshaw PG2* (BRI); Road to Worlds End Pocket, N of Ipswich (1.5 km SE of Pine Mountain), Dec 1981, *Guymer 1628* (BRI); Sandy Creek, NW of Joalah N.P., Tamborine, 27° 48'S, 152° 56'E, Dec 1987, *Mertons s.n.* (BRI [AQ408219]). DARLING DOWNS DISTRICT: Bunya Mountains N.P., Cherry Plain to Mt Kiangarow, 26° 40'S, 151° 32'E, Jul 2001, *Forster PIF27478 & Booth* (BRI, MEL, NSW); Cawdor, near Toowoomba, Jan 1976, *Gilbert s.n.* (BRI [AQ114754]); Between Gowrie Junction and Highfields, *McKenzie s.n.* (BRI [AQ397008]); near Rogers Park, S.F. 289, Cooyar, Feb 1991, *Rider s.n.* (BRI [AQ503777]); Bunya Mountains, Dec 1883, *Scortechinii s.n.* (MEL 1583913). **New South Wales.** Lismore, Oct 1894, *collector unknown* (NSW 193805).

Distribution and habitat: *Triflorensia cameronii* is endemic to south-eastern Queensland and northern New South Wales with a northern limit at Yarraman and a southern limit near Lismore. Plants occur in dry rainforest (araucarian microphyll vineforest, semi-evergreen vine-thicket) on volcanic soils derived from basalt (**Map 3**).

Typification: White (1926) clearly indicated that the type citation covered two specimens with the same number given for collections made on different days, *viz.* “flowering specimens Oct. 1924, fruiting specimens Dec. 1924”. The flowering specimen is the better of the two specimens and is selected here as lectotype for the name.

Notes: *Triflorensia cameronii* is readily recognisable from the other two species by its larger ellipsoid fruits, leaves that are elliptic or lanceolate and the inflorescences that are much branched and glabrous.

Conservation status: *Triflorensia cameronii* is not considered threatened in Queensland where it is present in Bunya Mountains and Joalah National Parks and a number of State Forests. In New South Wales this species is listed as Endangered (NSW Scientific Committee 2004).

Etymology: Named for McRae (Mac) Archibald Cameron (1897–1994), member of the 5th Australian Light Horse in World War 1, subsequently District Forester at Yarraman and collector of the type.

- 3. *Triflorensia ixoroides* (F. Muell.) S.T. Reynolds **comb. nov.**; *Diplospora ixoroides* F. Muell., *Fragm.* 9: 182 (1875). **Type:** Rockhampton, *s. dat.*, *Dallachy s.n.* (lecto: K; isolecto: MEL) *fide* McGillivray (1972) [as *Ixora triflora* R. Br. ex Benth. *nom illeg.*]**

[*Ixora triflora* auct. non (Forst.) Seem.; Benth., *Fl. Austral.* 3: 416 (1867). pro parte (quoad specimen “East Coast, *Brown*”¹ (pro parte [specimens at K and MEL only]); Rockhampton, *Thozet*² (MEL); Rockhampton, *Dallachy*² (K, MEL); Broad Sound, *Bowman*³ (*n.v.*)]

¹ This collection (East Coast, *R. Brown*) is a mixed collection of two species. The fruiting specimens (at BM, CANB) that are labelled Thirsty Sound and annotated (probably by Brown) as ‘*Ixora triflora*’ or ‘*Pavetta triflora*’ (BM specimen) are *Ixora queenslandica* Fosberg, whereas the flowering specimens (at K, MEL) that are annotated by Brown as ‘*Canthoides*’ (BM specimen) are *Triflorensia ixoroides*.

² The flowering specimens (*viz.* Rockhampton leg. *Dallachy* (MEL), Rockhampton leg. *Thozet* (MEL), and probably Broad Sound, leg. *Bowman* (see ³ below) match Bentham’s description of the inflorescence and flowers which are that of *Diplospora ixoroides* F. Muell.

³ This collection is probably referable to *Triflorensia ixoroides* as it has been recorded from this locality.

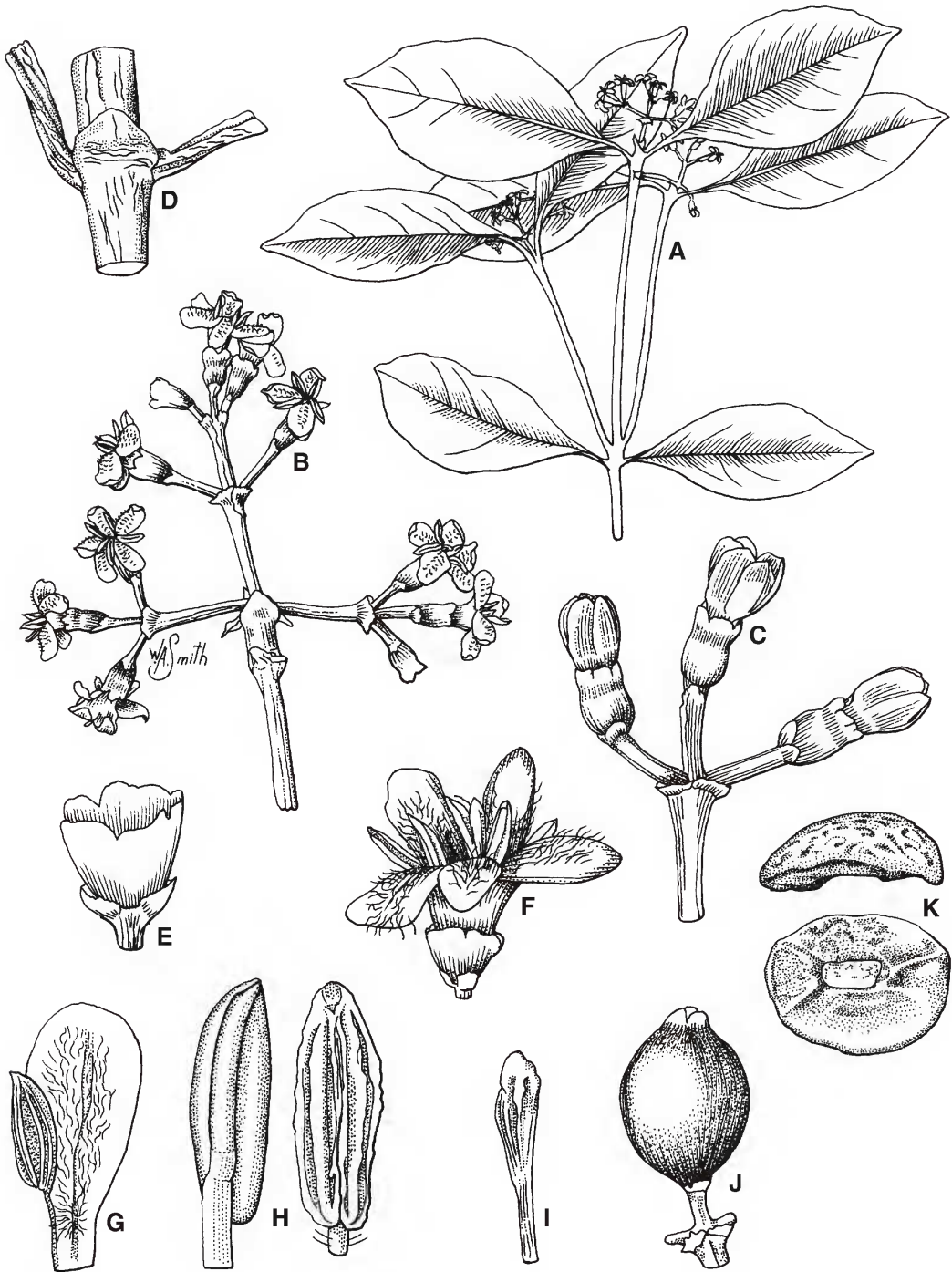


Fig. 4. *Triflorensia cameronii*. A. habit (flowering) $\times 0.5$. B. detail of inflorescence showing bracts $\times 2$. C. detail of dichasial cyme $\times 3$. D. stipule $\times 3$. E. calyx with bracteoles $\times 8$. F. flower $\times 4$. G. petal with anther $\times 6$. H. two faces of anther $\times 12$. I. style with stigma $\times 6$. J. fruit $\times 3$. K. dorsal and ventral view of seed $\times 6$. All from *District Forester* (BRI [AQ10266]). Del. W. Smith.

Tarenna triflora (R.Br ex Benth.) Ali & Robbr.,
Blumea 35: 302 (1991) *nom. illeg.* (based
on *Ixora triflora* R. Br. ex Benth. *nom.*
illeg.)

Tarenna sp. (Ka Ka Mundi NPW.J. McDonald
+ 4642) (Reynolds 1997: 184; Forster &
Halford 2002: 177)

Illustrations: Jones (1986: 88); Ross (1986: 342,
fig. 47M); Ali & Robbrecht (1991: 282).

Shrubs or small trees 2.5–6 m high; bark smooth or slightly rough, pale grey or grey brown; branchlets pale brown or grey, slightly 4-ridged towards their apex and sparsely minutely hairy; nodes dilated; supra-axillary branching frequent (that is the main axis of the branchlet is trichotomously branched at some distance above the last node, with the internode (between the last node and the upper trichotomous branch) usually very conspicuous. Leaves petiolate; lamina elliptic, subacute at both ends, 2–4.5 (–6) × 0.6–1.8 (–2.7) cm; margins thickened, coriaceous, dark green and very shiny on upper surface, pale green and dull below; midrib raised above and deeply channelled; lateral nerves 6 or 7 pairs, subpatent, looping at margins, not apparent on lower surface; petioles 2–4 mm long. Stipules connate towards the base, with lobes broadly ovate, obtuse; colleters present inside, prominent. Inflorescences resinous when very young, usually very small, 0.4–1 × c. 1.2 cm, with 3 branches clustered on a short stalk (this 2–7 mm long), or clustered at apex of the uppermost pair of leaves; peduncles finely hairy; each of the three branches of the inflorescence terminated by a triad; all three flowers or the lateral ones only are replaced by three branches each (these branches are 2–7 mm long) and terminated by a triad; flowers of each triad occasionally replaced by 3 branches each bearing a sessile flower in the centre and 2 stalked lateral branches; whole inflorescence ultimately 7–13 (–21)-flowered; central branch of the inflorescence rarely with an internode (this 2–3 mm long); bracts connate towards base, with lobes very broadly ovate, depressed on top with fimbriate margins, finely hairy at base; bracts at base of the 3-branched inflorescence (or on the top of the main peduncle) usually with thick and rigid, dark

lateral awns (those subtending the upper branches are awnless). Flowers (4 or) 5-merous; middle flower sessile; lateral ones shortly stalked (pedicels 0.7–1 mm long); bracteoles ovate, erose; calyx c. 1.7 × 2 mm, with limb wider; lobes paler than tube, c. 0.5 × 1 mm. Corolla infundibuliform, 5.5–6 mm long, white; tube 2–2.5 mm long, c. 3 mm wide at mouth, sparsely hairy inside with long projecting hairs, glabrous outside; lobes 2.5–3.5 × 2.5–3 mm, oblong with rounded apex, recurved, densely hairy inside (from about middle down), glabrous and paler at margins. Anthers c. 2 mm long, ovoid, apiculate, darker along the middle (on its dorsal side); filaments c. 0.5 mm long; disc fleshy, annular. Style and stigma slightly protruding from the corolla tube, as long as or shorter than the anthers, style finely patent hairy; stigma fleshy, with 2 erect lobes. Fruits subglobose, 5.5–7 × 5.5–9 mm, green turning black; seeds loose in the mature fruit, subangular, minutely obscurely pitted or reticulate. **Fig. 5.**

Selected specimens examined: Queensland. NORTH KENNEDY DISTRICT: Mt Stuart, near Townsville, 19° 21'S 146° 47'E, Feb 1996, *Cumming 15819* (BRI). SOUTH KENNEDY DISTRICT: Hazlewood Gorge, 13 km SSW of Eungella, 21° 15'S, 148° 27'E, Dec 1992, *Bean 5267* (AD,BRI). LEICHHARDT DISTRICT: Rosewood forest, Taunton National Park, 23° 31'S, 149° 13'E, Oct 1995, *Brushe 420 et al.* (BRI); Connors River, Lake Plattaway, 22° 25'S 148° 55'E, Sep 1993, *Fensham 1211* (BRI); 10 km NW of Taroom, 25° 33'S, 149° 38'E, Jan 1996, *Fensham 2864* (BRI); Anvil Peak, Hodgson Range, 22° 41'S, 148° 01'E, Aug 1990, *Forster PIF7225* (BRI, MEL, QRS); Pine Mt, S.F. 79, 21° 44'S, 148° 50'E, Apr 1991, *Forster PIF8014 & McDonald* (BRI, QRS); Expedition N.P., Amphitheatre section, Cannondale Scrub, 25° 12'S, 148° 59'E, Nov 1998, *Forster PIF23871 & Booth* (BRI, MEL, QRS); Palmgrove N.P., NW of Taroom, 25° 01'S, 149° 15'E, Nov 1998, *Forster PIF23811 & Booth* (BRI, MEL, QRS); Carnarvon N.P., northern boundary of Ka Ka Mundi section, 24° 41'S, 147° 38'E, Aug 1991, *McDonald 4642 & Bean* (BRI, CANB, NSW). PORT CURTIS DISTRICT: "Greenfields", c. 14 km NE of Goovigen, 24° 04'S, 150° 24'E, Mar 1986, *Anderson 4113* (BRI); Western slopes of Mt McGuire, W of Gladstone, 24° 01'S, 151° 02'E, Nov 1996, *Aspland 1580* (BRI); Yeppoon Hill, Oct 1987, *Batianoff 9254 & Dillewaard* (BRI); Rockhampton, Jan 1865, *Dietrich 2301* (MEL); S.F. 583 Wietalaba, 24° 17'S, 151° 13'E, Dec 1995, *Forster PIF18268 et al.* (BRI). BURNETT DISTRICT: Auburn River N.P., 25° 43'S, 151° 03'E, Mar 1988, *Forster PIF3583 & Ross* (BRI, MEL); 4.5 km S of Binjour, 25° 34'S, 151° 27'E, *Forster PIF5873 et al.* (BRI, MEL). WIDE BAY DISTRICT: 1 km S of Booyal, 25° 13'S, 152° 02'E, Nov 1987, *Forster PIF3283* (BRI); Ashfield road, Bundaberg, 24° 52'S, 152° 24'E, Jan 1997, *Forster PIF20184* (BRI); 5 km SSW of Bauple, Dec 1982,

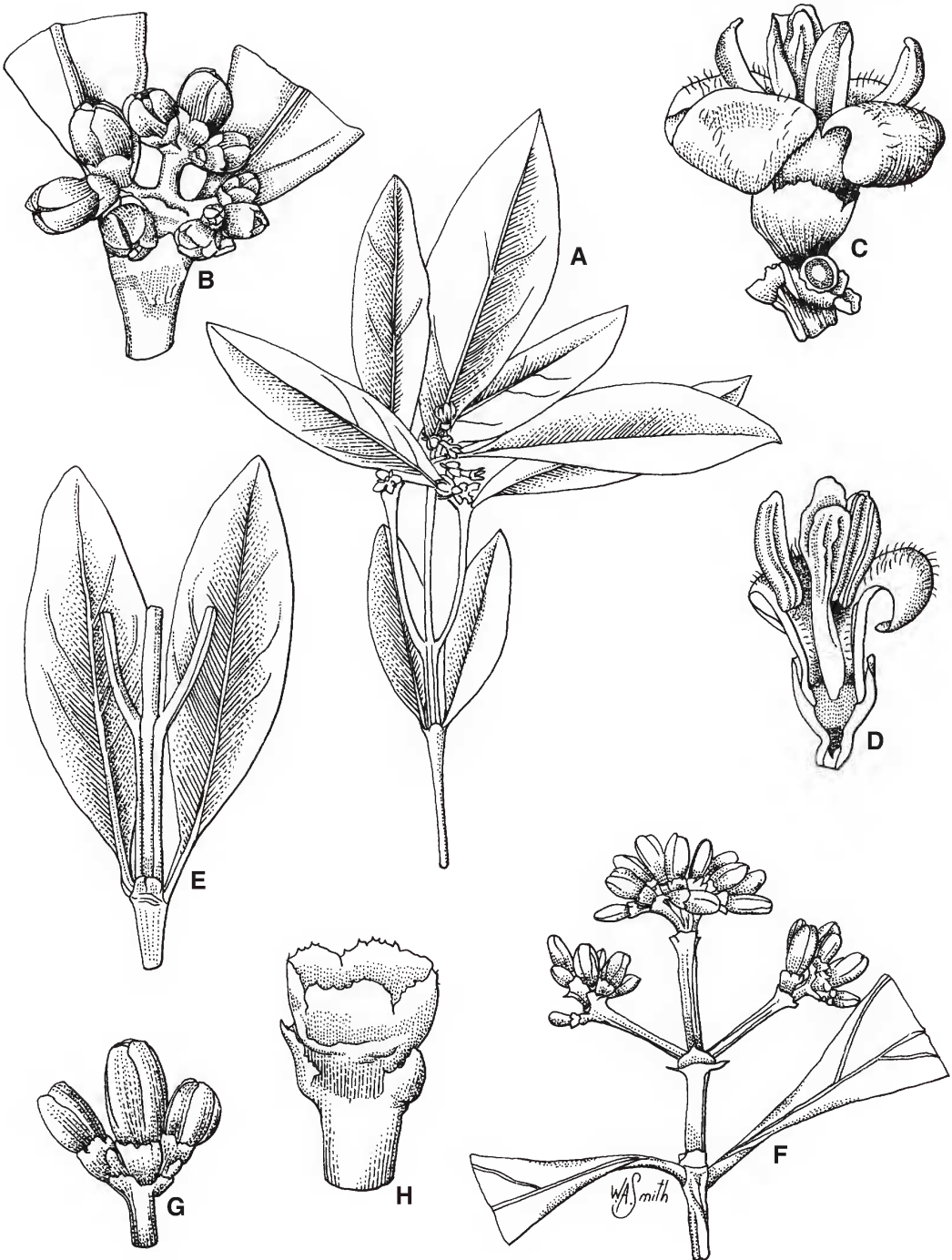


Fig. 5. *Triflorensia ixoroides*. A. flowering branch $\times 1$. B. detail of inflorescence $\times 4$. C. flower $\times 4$. D. longitudinal section of flower $\times 4$. E. part of branchlet showing supra-axillary branching and stipule $\times 2$. *Triflorensia australis*. F. flowering branch showing stipule and bract $\times 2$. G. detail of dichasial cyme $\times 4$. H. calyx with bracteoles $\times 16$. A–D from McDonald 4642 (BRI); E from Bean 5267 (BRI); F–H from Russell-Smith 4516 (BRI). Del. W. Smith.

Guymer 1835 & Dillewaard (BRI); S.F.38, 39 km WSW of Maryborough, 25° 38'S, 152° 19'E, Oct 1997, *Halford Q3435 & Huucks* (BRI).148° 27'E, Dec 1992, *Bean 5267* (AD, BRI).

Distribution and habitat: *Triflorensia ixoroides* has a wide distribution in eastern Queensland from near Townsville to Childers, usually on ranges and slopes, in dry rainforests (araucarian microphyll vineforest, semi-evergreen vine thicket), mostly on stony soil derived from volcanic substrates (basalt, granite) (**Map 3**).

Notes: *Triflorensia ixoroides* is readily distinguishable from the other two species by its small leaves and small inflorescences which are not as branched. The leaves are variable in the specimens seen in this study, they are usually small (between 3.5–4.5 × 0.8–2.4 cm) and narrowly elliptic in the majority of specimens (typical of this species), whereas a few specimens have either very small and usually very narrow leaves 2–3 × 0.6 cm (*viz. Fensham 2864* and *Beasley 102*), or largish leaves, 5–6 × 2–2.7 cm (*viz. Guymer 1835 & Dillewaard*), or occasionally both typical small leaves and largish leaves on the same branchlet (*viz. Johnson 3512 & Batianoff*).

Specimens with larger leaves may be confused with *T. australis* when sterile, but that species has a larger inflorescence and is only recorded from northern Australia.

Typification: The typification and application of the names *Diplospora ixoroides* F.Muell. and *Ixora biflora* R.Br. ex Benth. is complicated and confusing due to two species being used as syntypes for the latter name and to formulate the species description (Bentham 1867) as noted by White (1926), Moore (1926) and McGillivray (1972).

Bentham's (1867) description of the fruit and seed is that of an *Ixora* whereas the description of the flowers is not that of an *Ixora* and is referable to *Diplospora ixoroides* F.Muell. His syntypes except for Brown's collection from "East Coast"¹ (which is a mixed

collection) are that of the latter species. Moore (1926) after a query from C.T. White (BRI) noted the presence of two species in the collections labelled as *I. triflora* R.Br. ex Benth. at K and that Bentham's description of the flowers was different to that of Brown's manuscript description of this species. Brown had based his manuscript description of the flowers of *Ixora triflora* from a Solander manuscript that is based on an *Ixora* flower in the Banks & Solander collection⁴. Bentham obviously did not see this manuscript. Moore (1926) lectotypified *I. triflora* R.Br. ex Benth. by selecting the BM sheet of Brown's collection from East Coast (*viz. Thirsty Sound*) as lectotype. However, Fosberg (1938) noted the name *I. triflora* R. Br. ex Benth. was already an invalid name when published, being predated by *I. triflora* (Forst.) Seem. from Fiji which was published in 1866. He provided a new name *Ixora queenslandica* Fosberg for this taxon which is recognised as an extant species in that genus (Forster & Halford 2002). The name *Tarenna triflora* (Benth.) Ali & Robbr. (1991) based on *Ixora triflora* R.Br. ex Benth. *nom. illeg.* is therefore a superfluous and illegitimate name.

Diplospora ixoroides F.Muell. was described in 1875 because Mueller considered Bentham's description of *I. triflora* R.Br. ex Benth. inappropriate. He combined *I. triflora* under *D. ixoroides* but did not cite any of Bentham's syntypes, nor select a lectotype. His description and the two specimens he cited under this species name *viz. Port Denison, Fitzalan, and Neerkoll Creek, Bowman*, match the syntypes of *I. triflora* from Rockhampton, *Thozet* (MEL); Rockhampton, *Dallachy* (MEL), and the flowering specimens of Brown's collection from the East Coast (specimens at K, MEL), and also probably with Broad Sound, *leg. Bowman* (see above).

McGillivray (1972) lectotypified *Diplospora ixoroides* F.Muell. (as *Ixora triflora* R.Br. ex Benth. *nom. illeg.*) with one of Bentham's syntypes (of *I. triflora* R. Br. ex

⁴ Banks and Solander's collection from the Bay of Islets (BRI) is a flowering specimen of *Ixora queenslandica* Fosberg. The illustration provided by Miller, in Britten, *Illustr. Cooks Voy. 2*: p. 145, tab. 141 (May 1901) based on this collection is this species and not *Diplospora ixoroides* as captioned.

Benth.) viz. Rockhampton, *Dallachy* (lecto K, isolecto MEL). This specimen, however, is referable to *D. ixorooides* (see above), so he had therefore actually lectotypified *D. ixorooides* F.Muell.

Conservation status: *Triflorensia ixorooides* is widespread and not threatened. It is present in Auburn River, Carnarvon, Expedition, Palmgrove and Taunton National Parks, as well as numerous State Forests.

Etymology: The specific epithet undoubtedly alludes to the superficial appearance of this species to plants of the unrelated Rubiaceae genus *Ixora*.

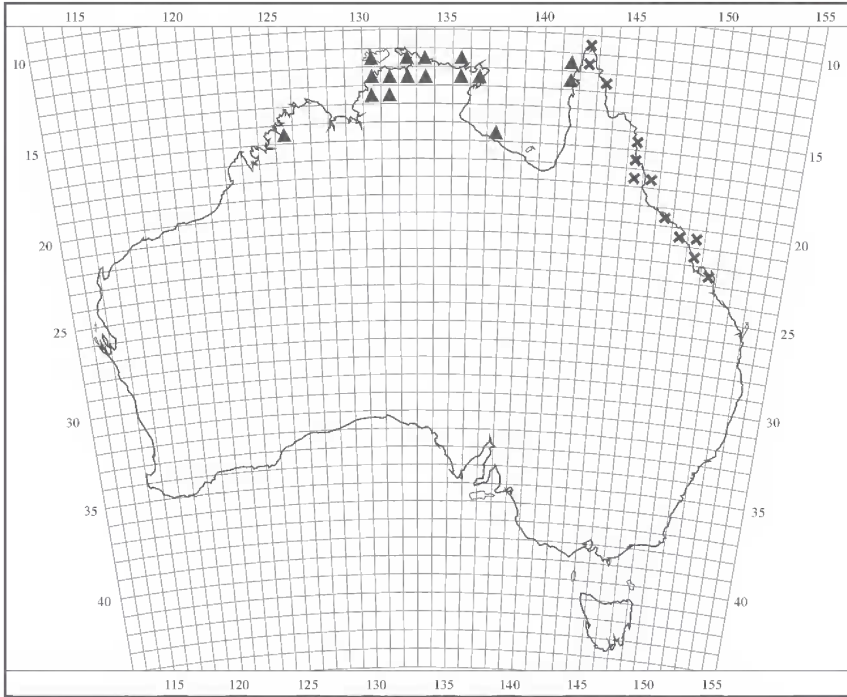
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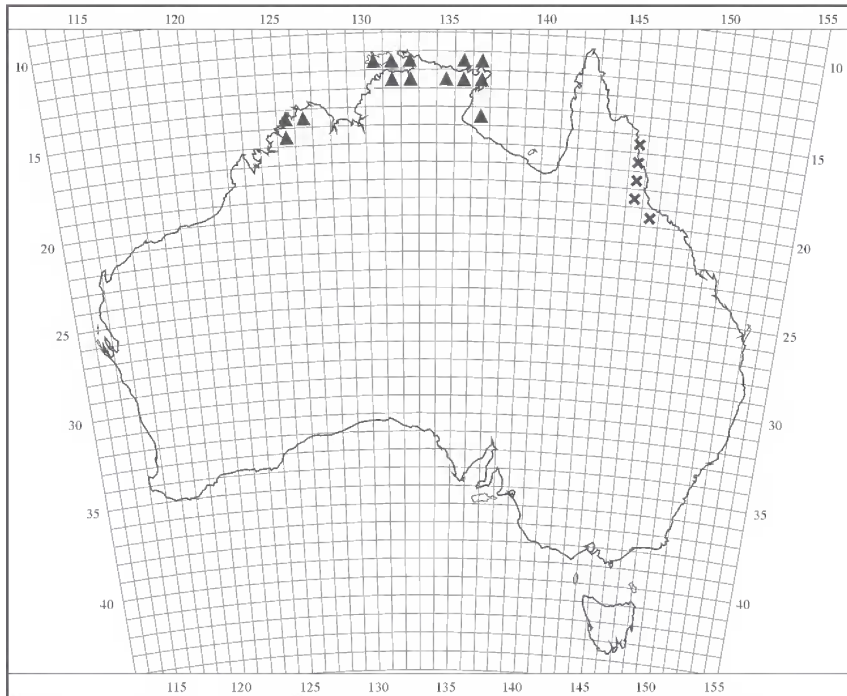
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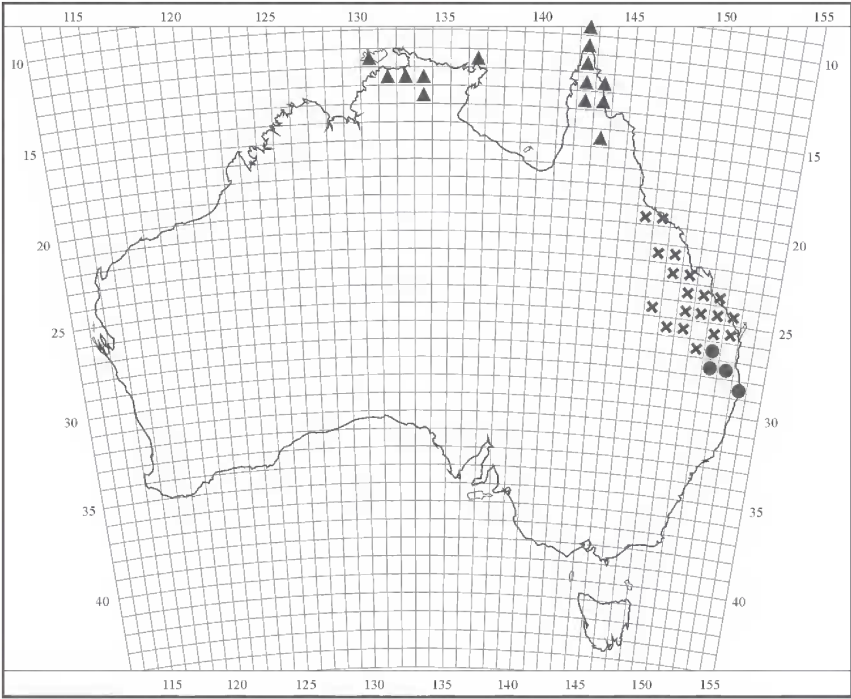
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Map 1. Distribution in 1° grids in Australia for *Tarenna dallachiana* subsp. *dallachiana* x and *Tarenna dallachiana* subsp. *expansens* ▲.



Map 2. Distribution in 1° grids in Australia for *Tarenna monticola* x and *Tarenna pentamera* ▲.



Map 3. Distribution in 1° grids in Australia for *Triflorensia australis* ▲, *Triflorensia ixoroides* ✕ and *Triflorensia cameronii* ●.